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Marine Progress

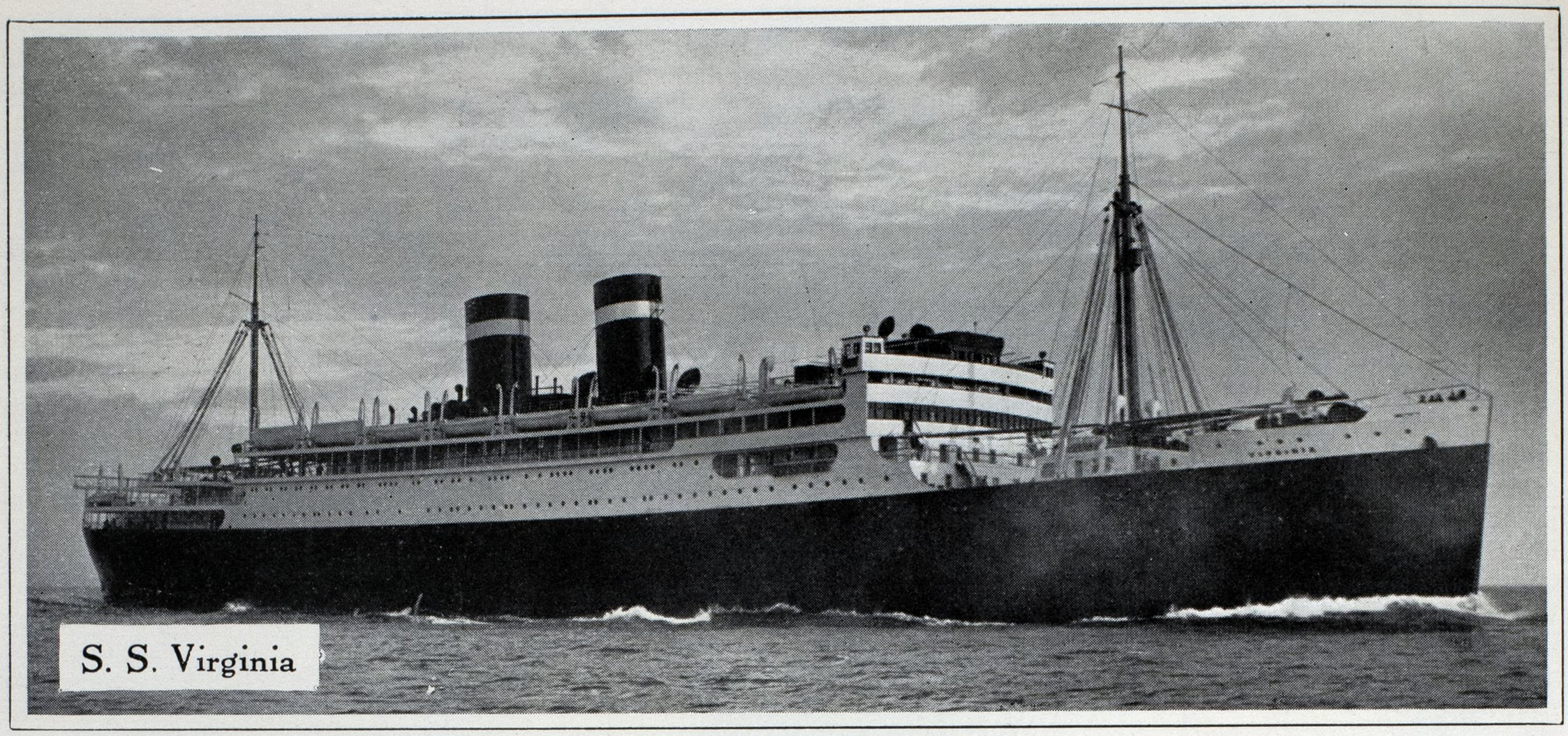
shown by

Distinctive Ships

Marine Review

April, 1929

*



S. S. Virginia

American Shipbuilding in 1928

Shipbuilding at Low Ebb—Many Inquiries Received—Prospects Improved —Progress in Engineering—High Labor and Material Cost a Problem

PROSPECTS for shipbuilding in American yards have been improving since last summer but a careful review of the work under way during 1928 seems to show clearly that the industry reached its low water mark in that period. For the year 1926 in this annual review of shipbuilding we were able to list 121 vessels, for 1927, 105 and for 1928 only 92. The year 1929 however, will show much better results as indicated by orders placed and the numerous proposals on which shipyard technical staffs have been exceedingly busy for the past several months.

It helps little to bemoan the fact that a great maritime nation like the United States should fall behind nations like Holland, Denmark, Sweden and Japan, to say nothing of Germany and Great Britain, in shipbuilding. During 1928, according to Lloyd's records, the United States launched 91,357 gross tons whereas Great Britain and Ireland launched 1,445,920 gross tons. This is for merchant vessels of 100 gross tons and upward. And this was for a year which, in total tonnage launched the world over, exceeded every year since 1921; in a year which showed a gain of nearly 414,000 gross tons over 1927.

But there is a revival in American shipbuilding now at hand of proportions that may ultimately astonish the world. This is said with full appreciation of the fact that most of the shipyards need work urgently and none of them is working at anywhere near full capacity. Perhaps nothing aggravates the shipbuilder who is still building ships more than the statement that he has plenty of work to do and that future prospects are very bright. In spite of the shipbuilder's tendency, and he has good cause, to view the shipbuilding situation, present and future with a feeling of despair, certain fundamental changes are taking place that have already exerted a beneficial influence and

Motive Power Compared--Two Years

Types	No. 1928	No. 1927	Per Cent 1928	Per Cent 1927
Steam reciprocating coal burner	19	27	20.6	25.7
Steam reciprocating oil burner	7	15	7.6	14.3
Steam turbine coal burner	1	0	1.1	0.0
Steam turbine oil burner	4	8	4.4	7.6
Diesel engine direct drive	31	27	33.7	25.7
Diesel engine electric drive	19	18	20.6	17.2
Turbine-electric oil burner	9	9	9.8	8.6
Turbine-electric coal burner	2	1	2.2	0.9
Totals	92	105	100.0	100.0

Recapitulating for Primary Power

Types	No. 1928	No. 1927	Per Cent 1928	Per Cent 1927
Steam—As primary power	42	60	45.6	57.2
Diesel—As primary power	50	45	54.4	42.8
Totals	92	105	100.0	100.0

Recapitulating for Power at Propeller

Types	No. 1928	No. 1927	Per Cent 928	Per Cent 1927
Steam—Direct and reduction gears	31	50	33.7	47.6
Diesel—Direct drive	31	27	33.7	25.7
Electric—Steam and diesel	30	28	32.6	26.7
Totals	92	105	100.0	100.0

Recapitulating for Fuel

Types	1928	1927	1928	1927
Steam—Burning coal	22	28	23.9	26.7
Steam—Burning fuel oil	20	32	21.7	30.5
Diesel—Diesel oil as fuel	50	45	54.4	42.8
Totals	92	105	100.0	100.0

as time goes on are bound to be increasingly effective in giving work to American shipyards.

Revival of interest in building ships of ocean going class in American shipyards may be said to be due to several causes among which are: Constantly improving world trade conditions. The shipping board's consistent policy of maintaining American flag ships in many widely separated services, which is having the gradual but steady effect of bringing our shippers and our marine men into actual grips with practical conditions involved in these operations, and thus knowing the worst, making them American shipminded. Growth of wealth and industrial expansion, creating ever greater domestic markets and an increasingly keener sense of appreciation of foreign markets. The direct effect of the Jones-White act in actually awarding around thirty mail contracts in specified services, these contracts in many cases requiring the building of new ships within a certain period of time. The cruiser program of the navy, giving seven cruisers and one airplane carrier to private yards orders for which can be expected during this year and next.

ANALYSIS OF AMERICAN MERCHANT SHIPBUILDING – 1928

Types of Vessels	No.	Recip. Coal	Recip. Oil	Turb. Coal	Turb. Oil	Diesel Oil	Die.Elec Oil	Tur.Elec. Coal	Tur.Elec. Oil
Passenger–Ocean	6				1	1			4
Passenger–Coastwise	3				3				
Passenger–Sound	5	5							
Freighter–Coastwise	3	1		1			1		
Freighter–Lakes	1					1			
Tanker–Ocean	2					2			
Tanker–Coast,Bays	4					3	1		
Tanker–Lakes	2		1			1			
Ferry–Harbors	1		1						
Ferry–Bays,Rivers	11		1			4	6		
Ferry–Lakes	2	2							
Carferry–Lakes	2							2	
Towboat–Harbors	9	2				4	3		
Towboat–Rivers	12	7	2			1	2		
Dredge–Harbors	3					2	1		
Fishing–Ocean	9		1			8			
Special–Ocean	10						5		5
Special–Bays,Rivers	7	2	1			4			
Totals	92	19	7	1	4	31	19	2	9

One very serious difficulty faces American shipbuilders at this dawn of a better day in the industry, and that is the apparent high cost of ships. Everyone knows that there is such a thing as legitimate cost and no one denies anyone the right of a legitimate profit above such cost. The shipbuilder is living and working in exactly the same protected atmosphere as the industrialist as far as the cost of his material and labor is concerned. He is decidedly not, however, living in the same atmosphere when it comes to selling his product. Shipping is an international matter and in competition the first cost is very important. The shipbuilder is supposed to compete against the world on price. It is impossible for the American shipbuilder to do this.

Ships cannot be placed in mass production. They are modeled and fashioned and built by hand largely, to suit the needs of the operator determined through his own experience in his own service. It may be possible to do something in the way of standardization in certain classes of vessels, but in general little can be expected along this way. Man for man, the American mechanic is just as able, and he probably turns out somewhat more work than the foreign mechanic. He is not however a superman and with wages five times as great it is impossible to expect him to turn out as much work at the same cost. In other words we have to be prepared to face the fact that ships will cost more built here, than abroad. This differential will of course vary a good deal according to the ship; but compared with England, on the average, it is between 25 and 60 per cent.

Since shipbuilding is absolutely essential to the best business interests and to the safety of the

(*Continued on Page* 96)

Distinctive Ships - - Where to Find Them

Passenger Ships

Name and Service	*Page*
New Bedford, Nantucket	22
President Warfield, Baltimore-Norfolk	44
Virginia, New York-San Francisco	20
Virginia Lee, Cape Charles-Norfolk	25
Waialeale, Hawaiian Islands	21
Yorktown, Baltimore-Richmond	23

Freighters

Edward F. Farrington, New York Harbor	56
Material Service, Bulk Self-Unloader	34

Ferries

Cadillac, Passengers and Automobiles, Lakes	28
Dongan Hills, Passenger, New York Harbor	58
General Charles F. Humphrey, New York Harbor	32
Mott Haven, East River, New York	52

Ferries (Contd.)

The Straits of Mackinac, Passengers	24

Tankers

Delta Standard, Tanker, Sacramento River	42
Robert W. Stewart, Tanker, Great Lakes	50
Sun, Tanker, Ocean	48

Towboats

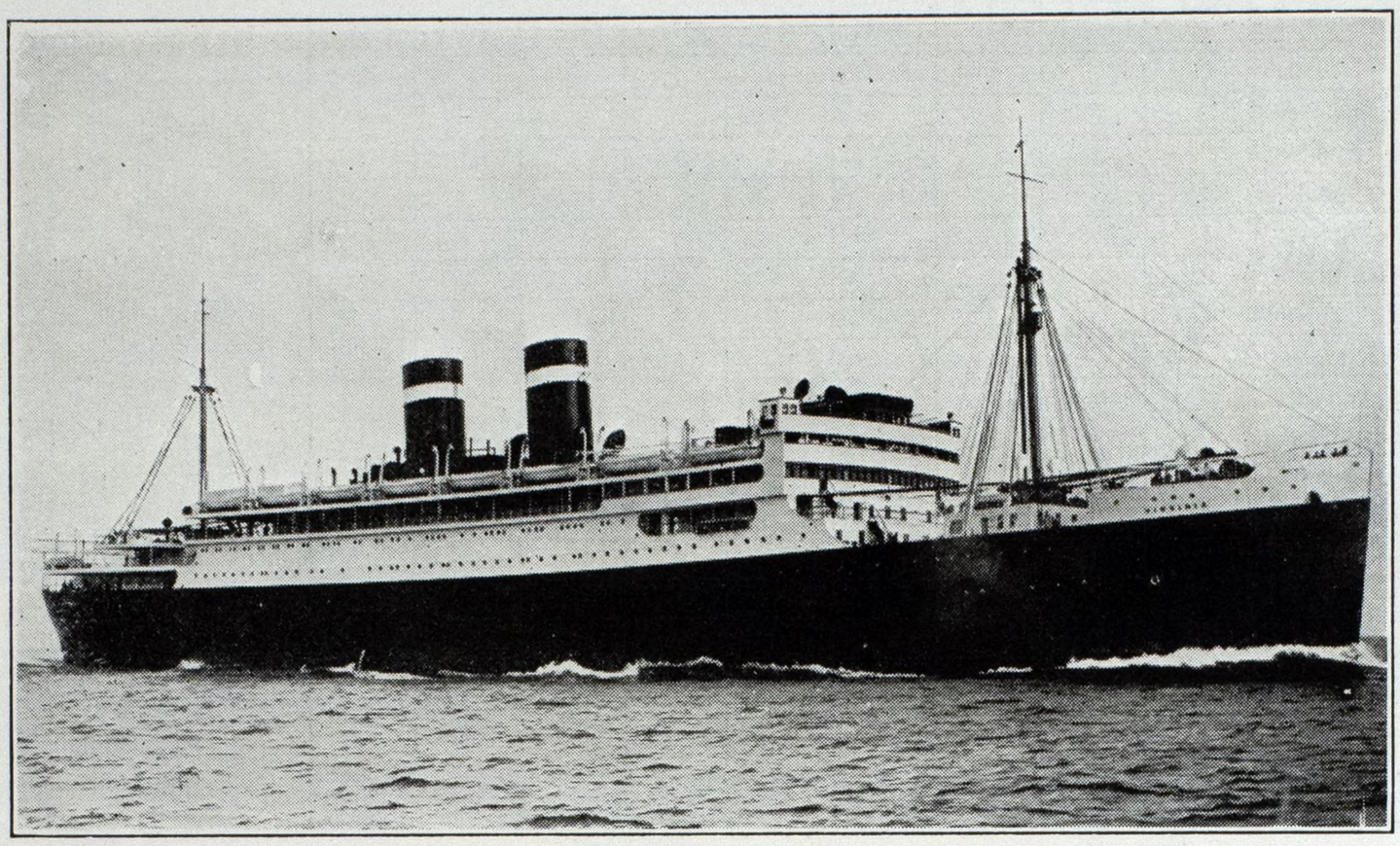
C. C. Slider, Western Rivers	36
John F. Cushing, Great Lakes	38
Warrior, Western Rivers	26
W. J. Harahan, Hampton Roads	40

Special Types

Boston College, Ocean Trawler	30
Chelan & Class, Coast Guard	46
City of Galveston, Fireboat	54

See Pages 70-71 for Complete Shipyard Record

VIRGINIA—Passenger Ocean Liner—Twin Screw—Electric



Name—VIRGINIA
Owner—Panama Pacific Line (I. M. M. Co.)
Builder—Newport News S. B. & D. D. Co.
Launch—Aug. 18, '28; completed, Nov. 26, '28
Classification—American Bureau of Shipping
Naval Architect—Hull designed by E. H. Rigg. Interior by shipyard and owner

HULL PARTICULARS

Length over all, 613 feet 1¼ inches; length between perpendiculars, 586 feet 4 inches; breadth molded, 80 feet 3 inches; depth molded to shelter deck, 52 feet; draft loaded, American Bureau of Shipping marks, 33 feet 9⅞ inches; displacement loaded, 32,816 tons; gross tonnage, 20,773; net tonnage, 12,167; passenger capacity, first class, 399; tourist class, 401; cargo capacity, 9500 tons; cargo capacity, cubic feet, 555,050; bunker fuel oil capacity in tons, 5437; speed, full load, average, 18 knots plus.

MACHINERY PARTICULARS

Main Engines—Turbo-electric propulsive machinery has been supplied by General Electric Co.; a twin screw installation with a total of 17,000 shaft horsepower at 120 revolutions per minute of the propellers. There are two A.C., turbine driven, generating sets each with a normal rating of 5250 kilowatts at 2640 revolutions per minute, 3700 volts, three phase; maximum rating is 6600 kilowatts, 4000 volts. Two main propulsion motors of three phase synchronous induction type, each with a normal rating of 5250 kilowatts at 111 revolutions per minute (6750 shaft horsepower); maximum rating of 6600 kilowatts at 120 revolutions per minute (8500 shaft horsepower). Each main propulsion motor is direct-connected to a propeller of three blades, 18 feet in diameter.

Boilers—Eight Babcock & Wilcox marine water tube boilers with a total heating surface of 43,688 square feet, and 4808 square feet of superheating surface; working pressure, 300 pounds; fuel, oil with B. & W. Cuyama burners.

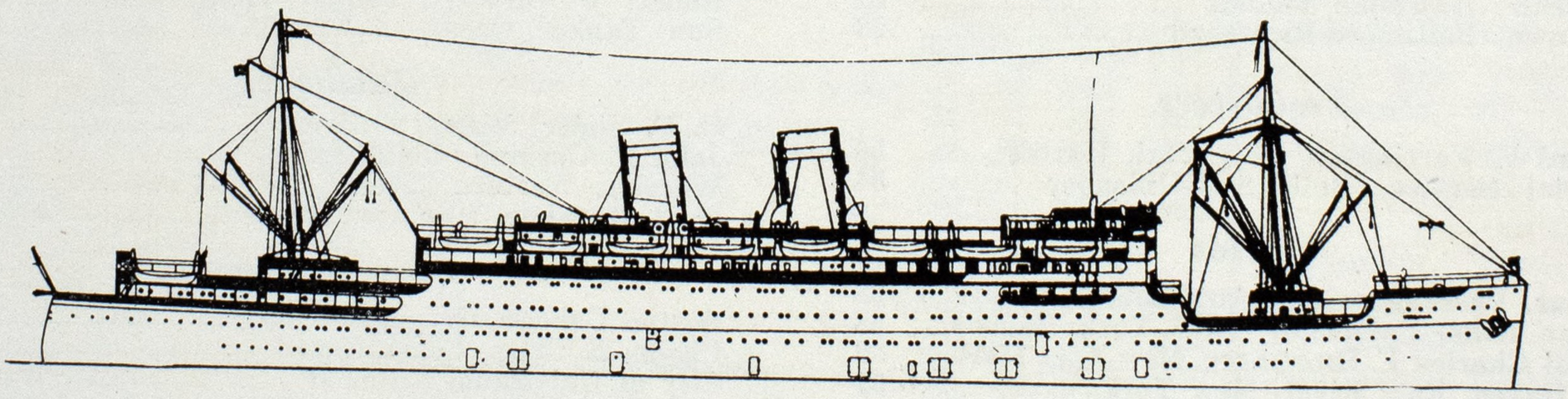
AUXILIARY EQUIPMENT

Pumps—Worthington and Warren
Windlass—Hyde Windlass Co.
Winches—Lidgerwood, Shepard, Hyde
Steering Gear—Hyde & Waterbury Tool Co.
Refrigeration—Brunswick-Kroeschell
Evaporator, Heaters—Davis Engineering Corp.
Fire Extinguishers—American-La France
Revolution Counters—Cummings Mach. Works
Electric Batteries—Elec. Storage Battery Co.
Windows—Kearfott Engineering Co.
Anchor Chain—National Malleable Co.
Thrust Bearings—Kingsbury Machine Works

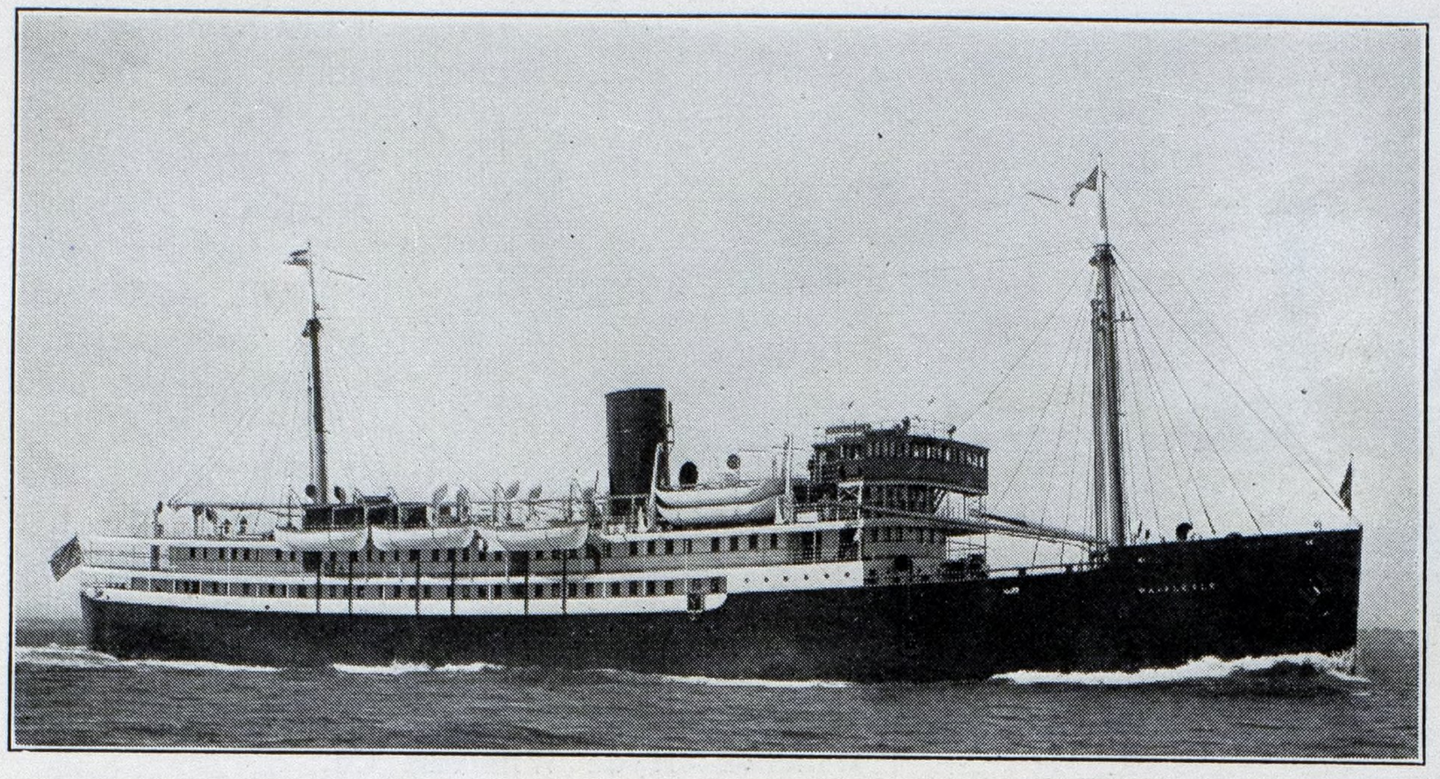
Deck covering for steel and wooden decks was supplied by Goodyear Tire & Rubber Co. and Selby Battersby Co. Magnesia covering for steam piping by Keasbey & Mattison Co.

DESCRIPTION

This vessel was placed in service on the run between New York and San Francisco early in December last. She is similar to the CALIFORNIA but 12 feet longer. Her turbine electric drive is giving good results in fuel economy, flexibility, cruising and in smoothness and quietness of operation. A speed of 19 knots was attained on trials. A description appears in January MARINE REVIEW.



WAIALEALE—Passenger—Inter-Island—Twin Screw—Steam



Name—WAIALEALE
Owner—Inter-Island Steam Navigation Co.
Builder—Bethlehem S. B. Corp., Union Plant
Naval Architect—E. P. McRitchie
Launched—Mar. 3, '28; completed, May 31, '28.
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 310 feet 10 inches; length between perpendiculars, 295 feet; breadth molded, 48 feet; depth molded to shelter deck, 27 feet 6 inches; draft, 17 feet 6 inches; displacement loaded, 4366 tons; deadweight at 17 feet 6 inches, 1850 tons; gross tonnage, 3092; passenger capacity, first class, 212; second class, none; third class, 96; cargo capacity, 1190 tons and 20 automobiles; cargo capacity in cubic feet, 85,897; bunker fuel oil capacity in tons, 556; speed, 15 knots.

MACHINERY PARTICULARS

Main Engines—Two complete expansion, combined impulse reaction type, turbines each developing 2000 shaft horsepower running at 3600 revolutions per minute. Each turbine is connected to its respective propeller through a single pinion double reduction gear giving a propeller speed of 135 revolutions per minute.

DESCRIPTION

Completed in the early summer of 1928 this vessel has rendered satisfactory service in carrying passengers and freight between ports of the Hawaiian islands. Her twin propellers are driven by geared turbines. She has accommodations for first class and steerage passengers and carries a crew of 67 when fully manned.

Both turbines and reduction gears were built by the Westinghouse Electric & Mfg. Co. A sister vessel of the WAIALEALE and a smaller similar vessel with the same type of machinery were recently ordered by the owner and are now under way at the Union plant.

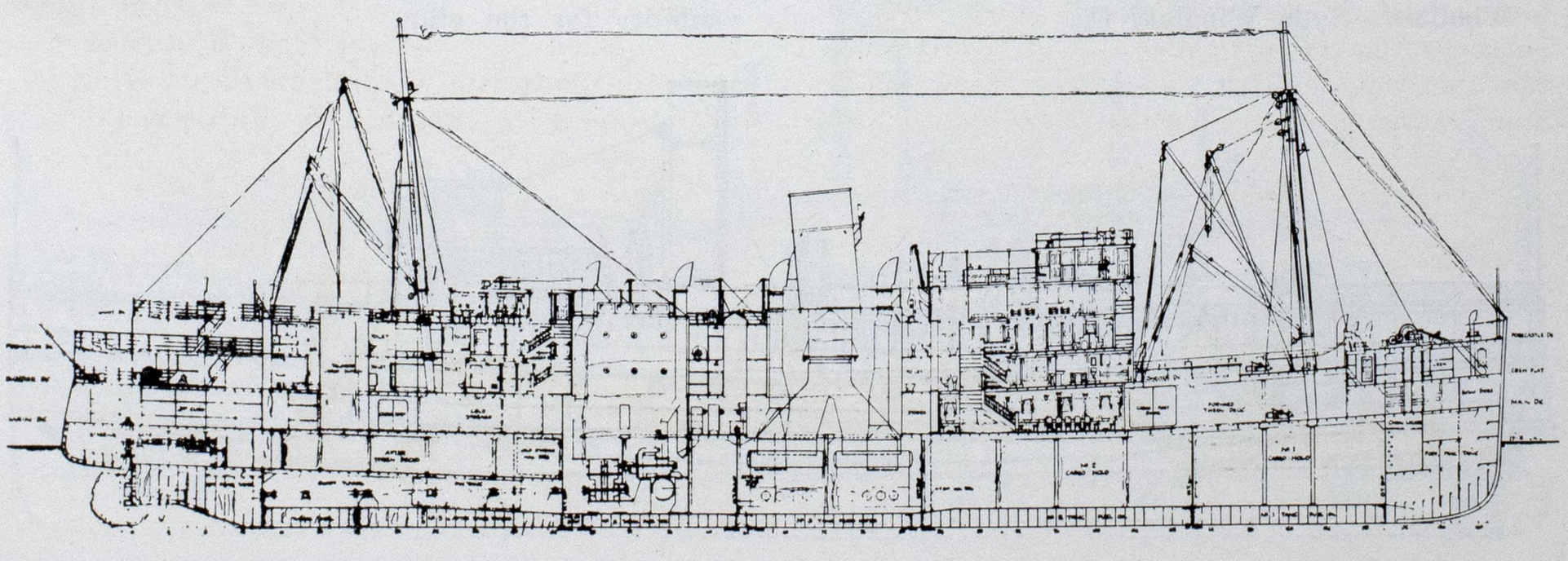
Boilers—Four, Babcock & Wilcox marine watertube boilers. Total heating surface, 12,268 square feet; total superheating surface, 1004 square feet; working pressure, 280 pounds; drum diameter, 42 inches; fuel, oil; Babcock & Wilcox superheaters and Cuyama oil burners.

AUXILIARY EQUIPMENT

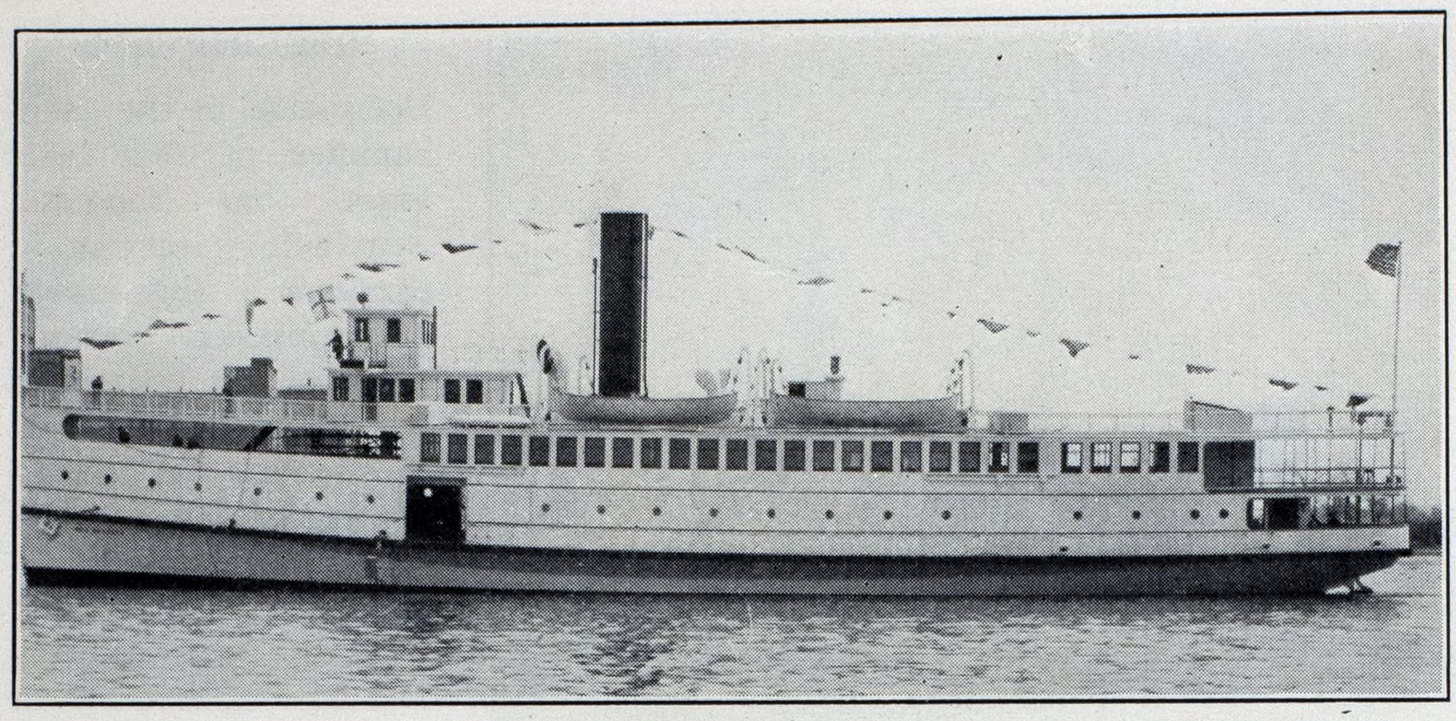
Manufacturers of:

Pumps—Warren Steam Pump Co.
Windlass—Hyde Windlass Co.
Winches—Allan Cunningham Co.
Steering Engine—Hyde Windlass Co.
Propellers—Bethlehem Shipbuilding Corp.
Refrigeration—Vulcan Iron Works
El. Generators—Two 75 k.w. Westinghouse
Evaporator, Heater—Davis Eng'r. Corp.
Thrust Bearings—Kingsbury Machine Works

The WAIALEALE is a substantially built ocean going passenger and freight vessel, the design suited to the special requirements of the service between the islands of the Hawaiian group.



NEW BEDFORD—Passenger—Single Screw—Steam



DESCRIPTION

Passenger and freight steamer for service out of New Bedford, Mass., to Martha's Vineyard and Nantucket. The hull is all steel with steel superstructure sides. There are side port doors of sliding type with upper and lower sections to lift out when handling cargo. The freight space is on main deck.

Name—NEW BEDFORD
Owner—New England Steamship Co.
Builder—Beth. S. B. Corp. Fore River Plant
Naval Architect—Albert F. Haas
Launched—May 5, '28; completed, May 19, '28
Classification—None

HULL PARTICULARS

Length over all, 210 feet ¾-inch; length between perpendiculars, 202 feet; breadth molded, 36 feet; depth molded, 14 feet 3 inches; draft extreme, 9 feet 7 inches; displacement loaded, 903 tons; gross tonnage, 1117; net tonnage, 451; passenger capacity, 2000; cargo capacity, 250 tons including 36 automobiles; bunker fuel capacity in coal, 30 tons; speed, 14 knots.

MACHINERY PARTICULARS

Main Engine—One, 4-cylinder, triple expansion, steam engine, built by the Fore River plant, Bethlehem Shipbuilding Corp. Size cylinders, 16 x 26 x 30 x 30 inches and 24-inch stroke. Indicated horsepower, 1200.

Boilers—Two, Babcock & Wilcox watertube marine boilers having a total heating surface of 4110 square feet; working pressure, 200 pounds per square inch. Fuel, coal.

AUXILIARY EQUIPMENT

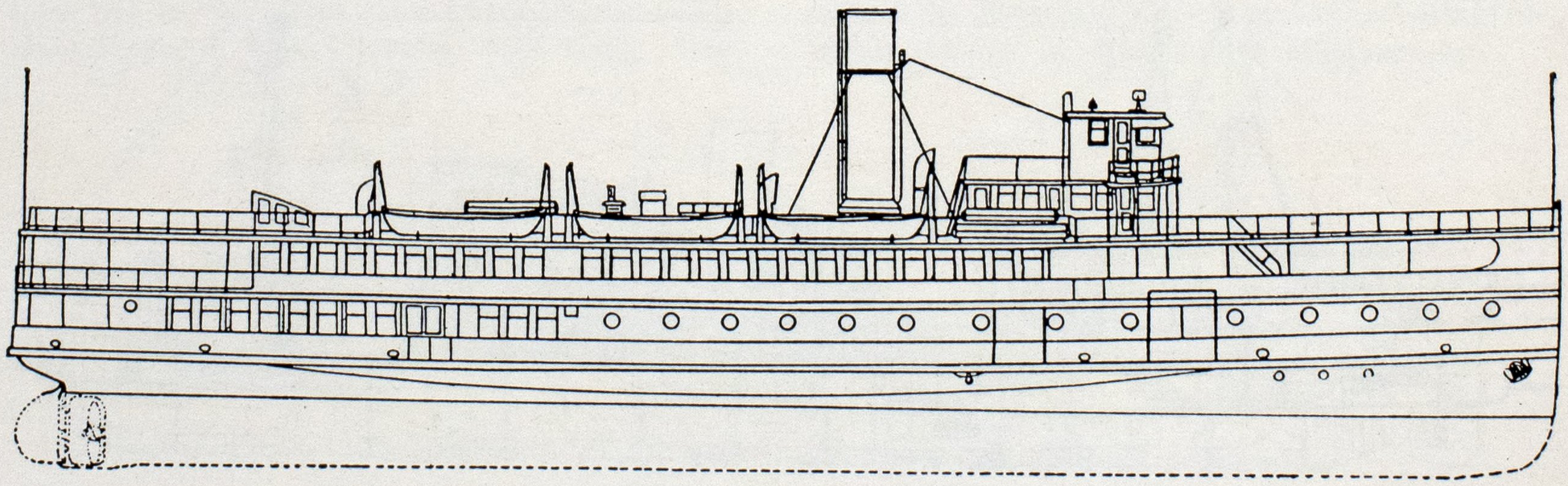
Manufacturers of:

Pumps—Worthington; Warren; B. S. Corp.
Windlass—Hyde Windlass Co.
Winches—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Propellers—Bethlehem Shipbuilding Corp.
Refrigeration—Kelvinator Units
Electric Generators—1—15 k. w., 1—3 k. w. General Electric Co.
Feed Water Filter—Davis Engineering Corp.
Fire Protection—Amer. LaFrance & Foamite

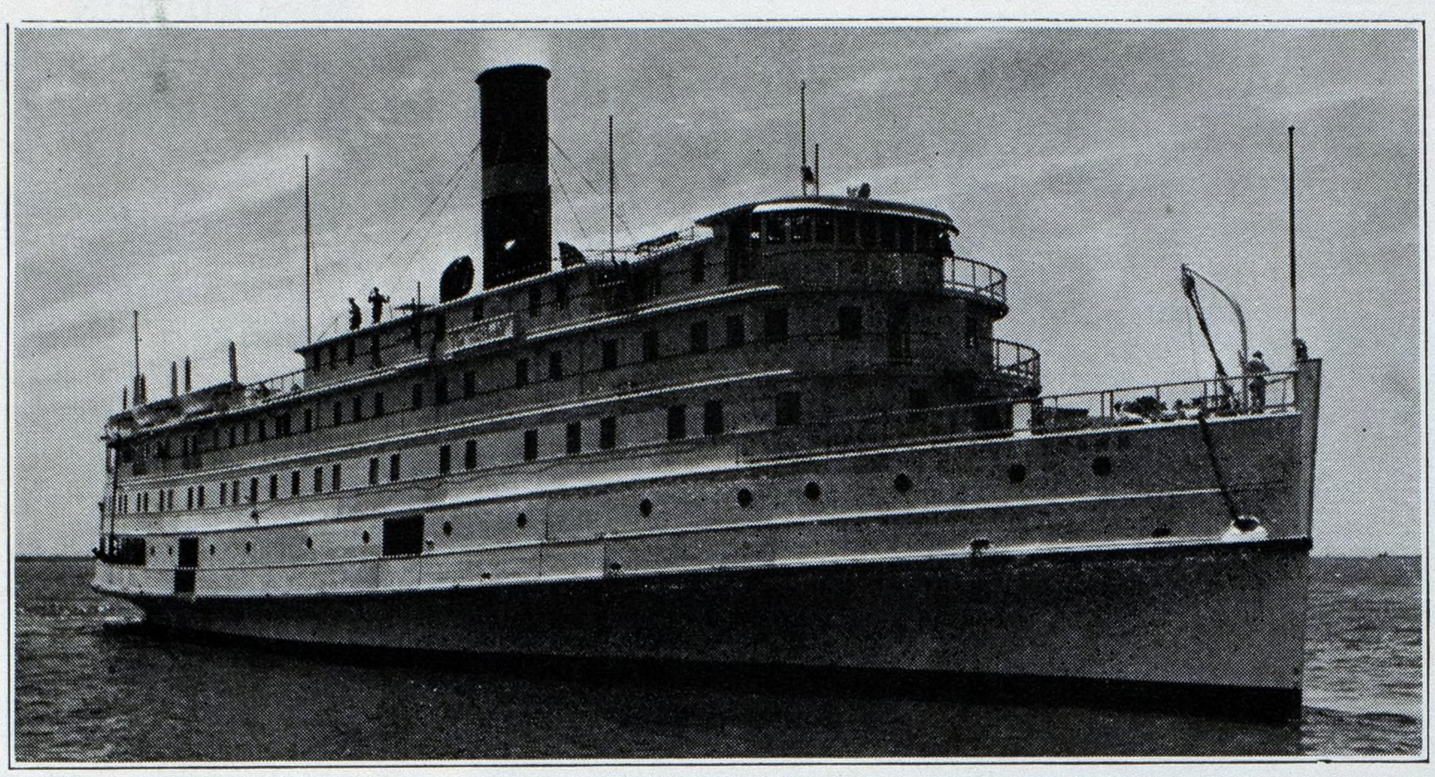
The NEW BEDFORD is a duplicate in practically all particulars of the MARTHA'S VINEYARD (formerly the ISLANDER) and the NANTUCKET (formerly the NOBSKA). She is therefore the third vessel to be placed on the New Bedford, Mass., to Martha's Vineyard and Nantucket run within a period of five years. She is to be followed shortly by the fourth similar vessel now under construction at the Fore River plant and named the NAUSHON.

These boats have proved excellent sea boats and have become increasingly popular with the many summer travelers to and from the island of Nantucket. It is of interest to note that the owner continues to use coal as fuel.

On the upper deck of the vessel there is a wooden house for the president's room and for officers' accommodations. The wooden pilot house on top of this house is equipped with the usual navigating outfit and allows maximum visibility for the pilot.



YORKTOWN—Passenger—Bay—Single Screw—Steam



Name—YORKTOWN
Owner—Chesapeake Steamship Co.
Builder—Newport News S. B. & D. D. Co.
Naval Architect—H. F. Norton, for builder
Launched—Feb. 25, '28; completed, May 17, '28
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 277 feet 3 inches; length between perpendiculars, 268 feet 8 inches; breadth molded, 54 feet 5¾ inches over guards; depth molded, 18 feet; draft loaded, 13 feet; displacement loaded, 2240 tons; gross tonnage, 1547; net tonnage, 817; passenger capacity, first class, 232; second class, 98; cargo capacity about 250 tons; cargo capacity in cubic feet, 69,200; bunker fuel capacity in coal, 117 tons; speed, 17¾ miles per hour.

MACHINERY PARTICULARS

Main Engine—One, 4-cylinder triple expansion surface condensing steam engine; size, 23 x 39 x 47 x 47 inches x 40-inch stroke; indicated horsepower about 2700; built by Newport News Shipbuilding & Dry Dock Co.

Boilers—Four, single ended scotch marine type; size, 14 feet diameter x 11 feet 4 inches long; total heating surface, 9464 square feet; working pressure 190 pounds per square inch; fuel, coal with natural draft.

DESCRIPTION

A single screw steel steamer with flared guards and the customary Chesapeake Bay type of superstructure now in service between Baltimore, West Point and Richmond on the James river. She is in general like the CITY OF RICHMOND of the same line. Cargo handling facilities include four elevator winches.

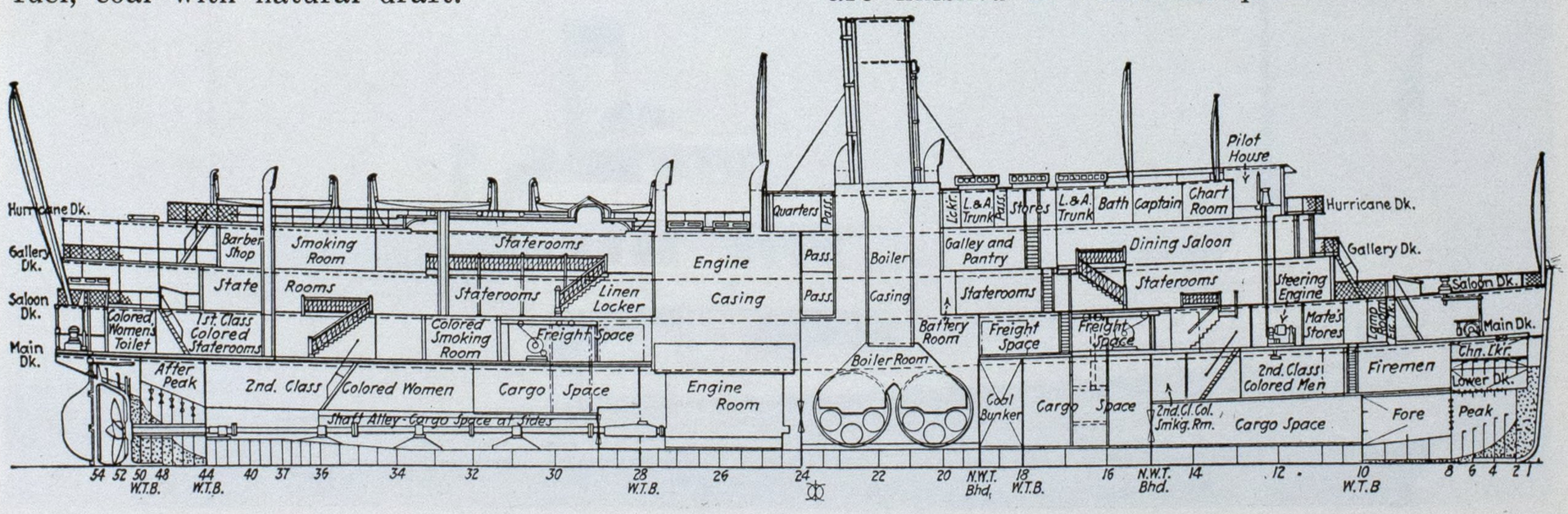
AUXILIARY EQUIPMENT

Pumps—Warren Steam Pump Co.
Windlass—Hyde Windlass Co.
Winches—Moore Plant—Beth. S. B. Corp.
Steering Engine—Hyde Windlass Co.
Propellers—Newport News S. B. & D. D. Co.
Refrigeration—Brunswick-Kroeschell Co.
Elec. Generators—Engberg's two 35 & 15 k. w.

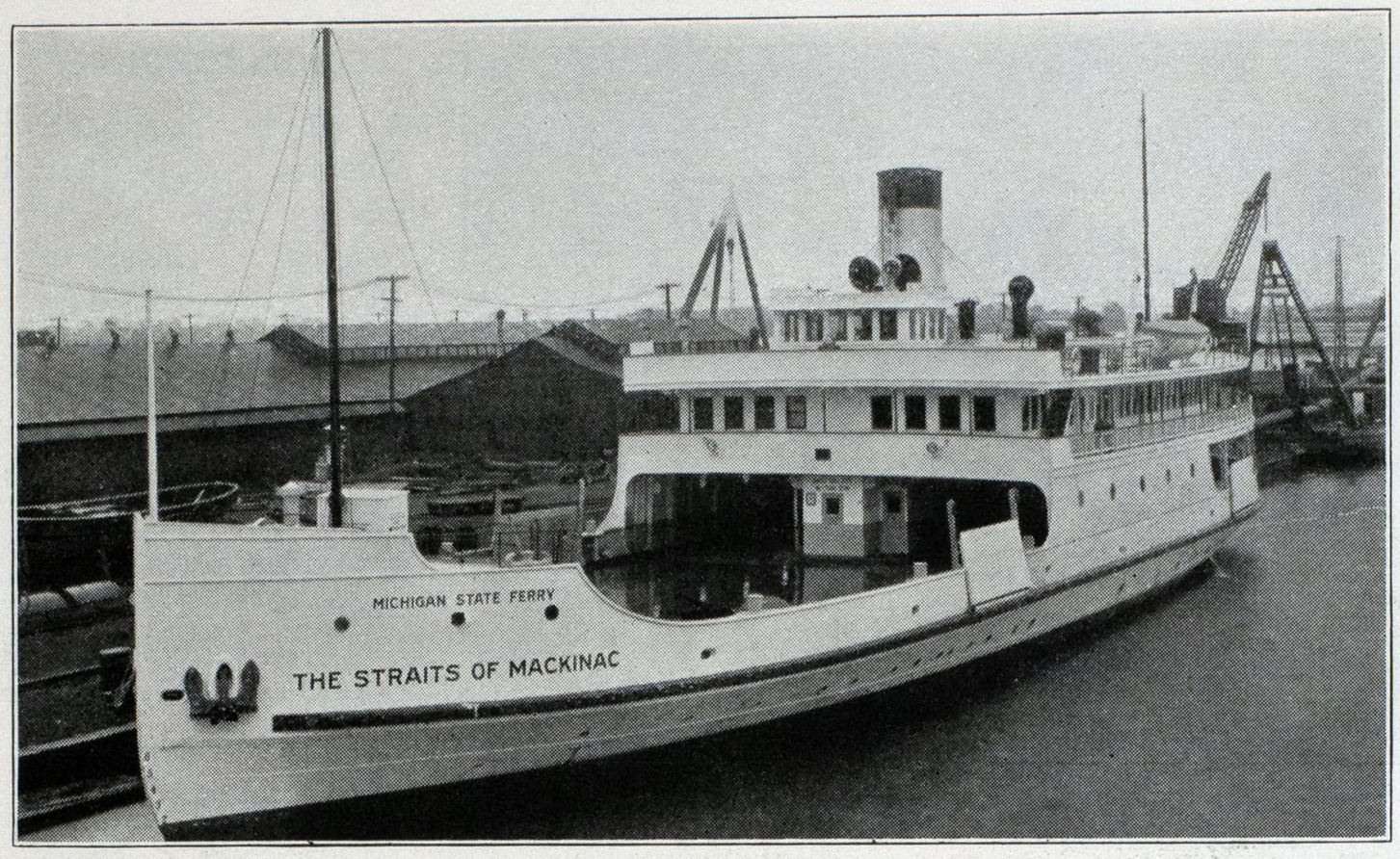
The YORKTOWN has been built on the Isherwood system of longitudinal construction and she is classed A1 under the American Bureau of

Interior arrangements are particularly attractive. There is a large light and cheerful dining saloon on the gallery deck forward giving passengers a fine view. Care has been taken to provide best facilities in the galley and pantries for serving excellent meals.

Staterooms are comfortable, well heated and lighted and are furnished with all the conveniences of a first class hotel. Many staterooms have attached bathrooms or showers and all are supplied with hot and cold fresh water. Saloon decks are carpeted and the first class smoking room, dining saloon and similar spaces are covered with rubber tiling in attractive patterns. Electric fixtures in the public spaces are finished in verde antique.



THE STRAITS OF MACKINAC—Ferry—Single Screw—Steam



DESCRIPTION

Increasing traffic between the upper and lower peninsulas of the state of Michigan across the straits of Mackinac necessitated the addition of another automobile and passenger ferry. The design of the present boat is based on the experience of the builder and owner in the lengthening and widening of two of the vessels in service. An all steel single ended steam propelled ferry.

Name—THE STRAITS OF MACKINAC
Owner—State of Michigan, Highway Dept.
Builder—Great Lakes Engineering Works
Naval Architect—For builder, Dwight True
Launched—April 28, '28; completed June 19, '28
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 203 feet; length between perpendiculars, 190 feet; breadth molded, 48 feet; depth molded, 16 feet 6 inches; draft, 11 feet 6 inches; displacement loaded, 1475 tons (2000 pounds per ton); gross tonnage, 733; net tonnage, 274; passenger capacity, 500; cargo capacity 60 automobiles; bunker fuel capacity in tons of coal, 150; speed, 13 miles per hour.

MACHINERY PARTICULARS

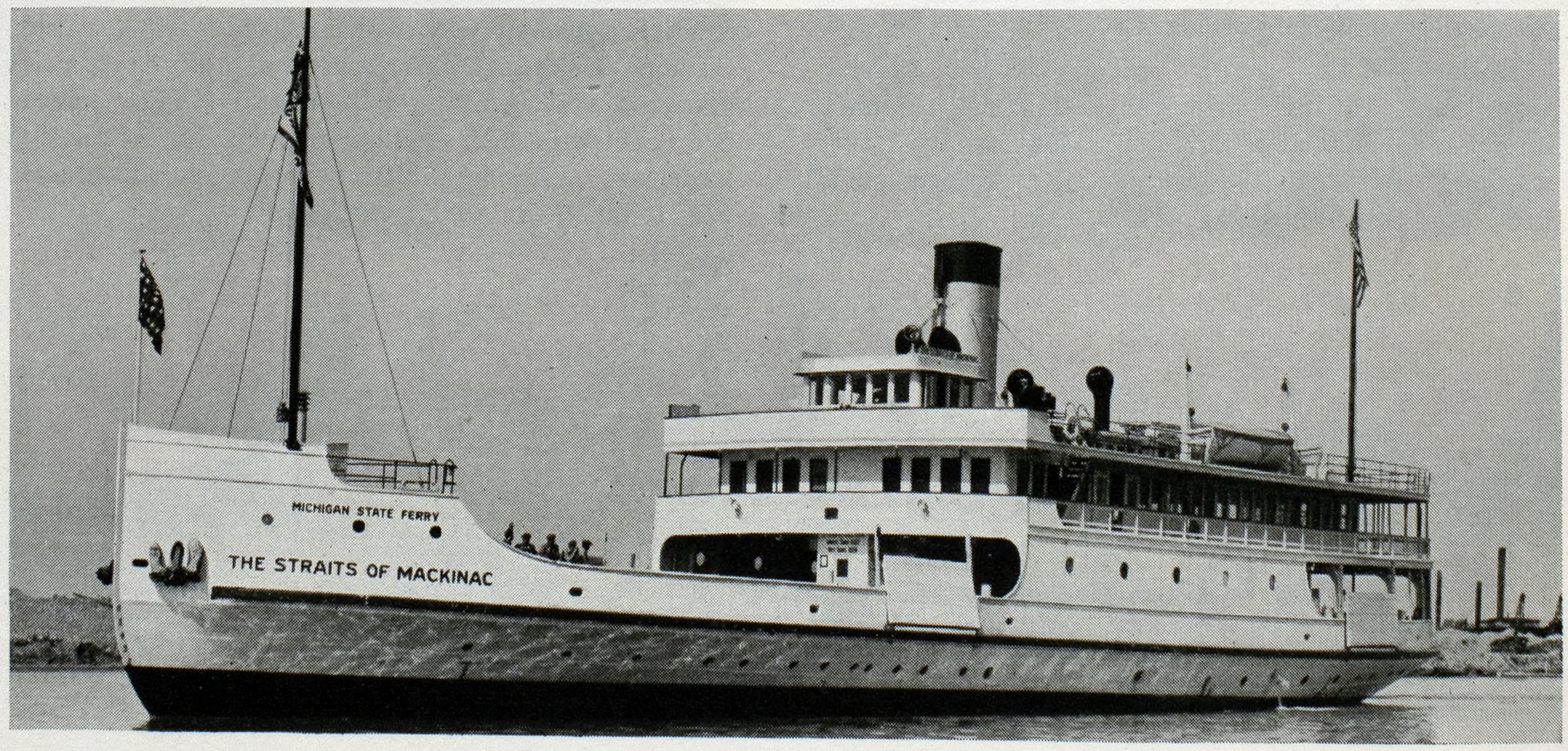
Main Engine—One 3-cylinder triple expansion steam engine built by Great Lakes Engineering Works. Size cylinders 16 x 26½ x 45 inches, and stroke 33 inches.

Boilers—Two, single ended scotch marine boilers built by Manitowoc Shipbuilding Corp. Size, 11 feet 10 inches in diameter x 11 feet long; fuel, coal.

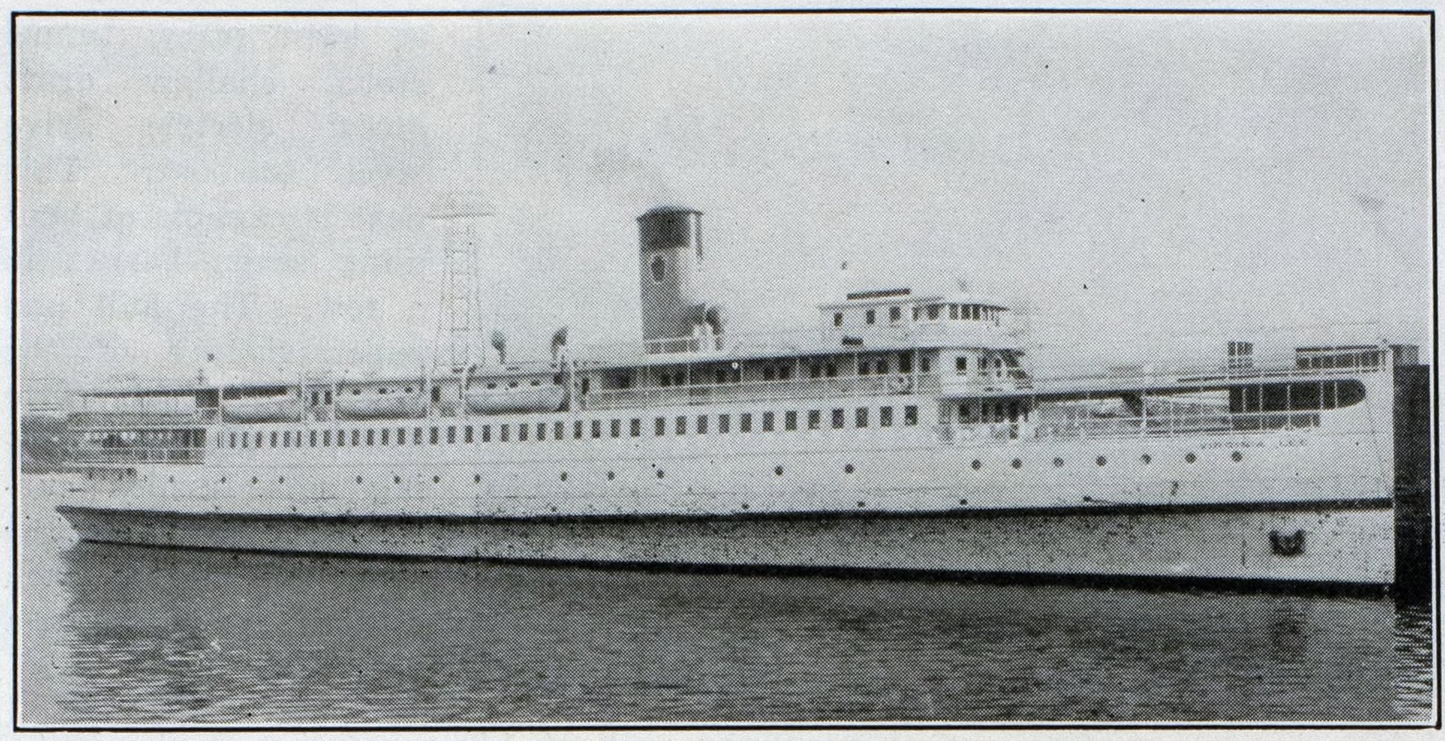
AUXILIARY EQUIPMENT

Pumps—Dean Pump Co.
Windlass—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Propellers—Great Lakes Engineering Wks.
Engine Direction Indicator—McNab

This ferry has been designed to meet the peculiar conditions of service and is therefore entirely unique. The hull is shallow and wide with the sides brought out to meet the main deck. The forward half of the main deck is uncovered permitting complete freedom in operating automobiles. The after covered half is unobstructed except for machinery casing along center line. A large house on the bridge-deck with a promenade all around.



VIRGINIA LEE—Passenger—Bay—Twin Screw—Steam



Name—VIRGINIA LEE
Owner—Pennsylvania Railroad Co.
Builder—Beth. S. B. Corp., Fore River Plant
Naval Architect—F. L. Dubosque
Launched—July 24, '28; completed Oct. 25, '28

HULL PARTICULARS

Length over all, 302 feet 6 inches; length between perpendiculars, 292 feet; breadth molded, 42 feet 5 inches; depth molded, 17 feet; draft, 11 feet 1inch; displacement loaded, 1640 tons; gross tonnage, 2158; net tonnage, 1189; passenger capacity, 1250; cargo capacity, 240 tons; bunker fuel capacity, 60 tons coal; speed, 18 miles per hour.

MACHINERY PARTICULARS

Main Engines—Two, 4-cylinder, triple expansion, steam engines, built by the Fore River plant, Bethlehem Shipbuilding Corp. Size cylinders, 18 x 30 x 34 x 34 inches and 27-inch stroke.

Boilers—Four, scotch marine type, built by the Bethlehem Shipbuilding Corp. The boilers are single ended and are 13 feet 6 inches in diameter and 11 feet 8 inches long. They are arranged two abreast with firing fronts facing and are arranged to burn coal.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Worthing Pump & Mach. Corp.
Windlass—Moore Plant—Beth. S. B. Corp.
Capstan—Moore Plant—Beth. S. B. Corp.
Steering Engine—Moore Plant, Beth. S. B.
Propellers—Fore River Plant, Beth, S. B.
Refrigeration—York Mfg. Co.—2 Ton
Electric Generators—Two 15 k.w., one 25 k.w. one 3 k.w., 115-volt d.c.—General Elec.
Eng. Direction Indicators—McNab
Thrust Bearings—Kingsbury Machine Works

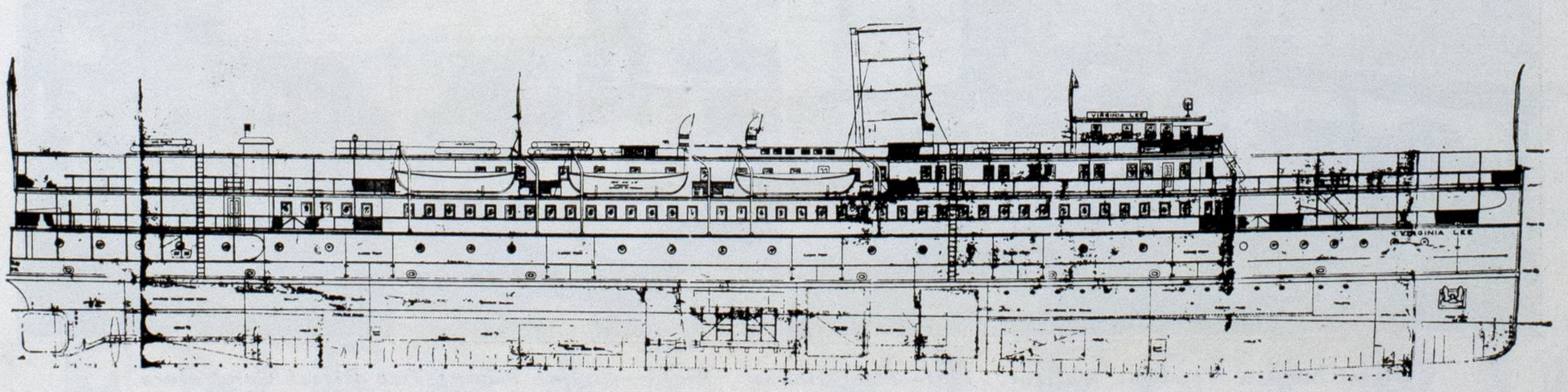
DESCRIPTION

This vessel was specially designed for the passenger and freight service between Cape Charles and Norfolk, Va. Automobiles are also carried. The hull is all steel with a steel deck house on the main deck. The balance of the superstructure is of wood. A seaworthy boat, able to stand the rough weather encountered.

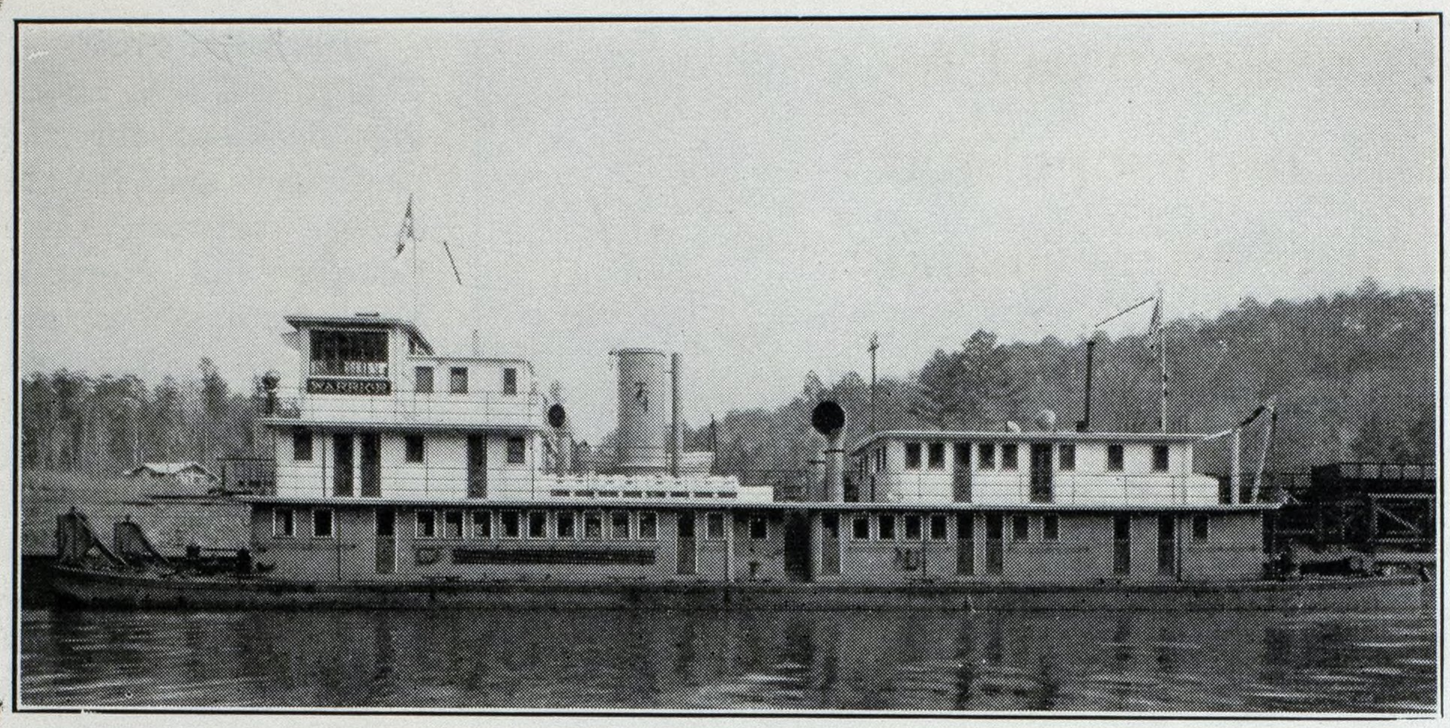
VIRGINIA LEE is a very well proportioned and trim looking vessel. Her outboard appearance is particularly agreeable. Her hull has length and fineness which gives her a speed of 18 miles per hour with about 2900 horsepower applied to two propellers.

The VIRGINIA LEE is used by the New York, Philadelphia and Norfolk division of the Pennsylvania railroad between Cape Charles and Norfolk, Va. She carries passengers, automobiles and freight. The deck area in the freight space on the main deck is covered with a bitumastic composition and the overhead deck in this space is protected with asbestos wood sheathing.

There are two dining rooms, one for white and one for colored passengers located on the lower deck aft, the pantry and galley being adjacent. There is a separate mess room for officers and crew. Cork tiling is used in the dining room and passengers' saloon. Rubber tiling is used in the smoking room, toilet spaces and stair treads. The finish in passengers spaces is light green with red mahogany.



WARRIOR—River Towboat—Twin Screw—Diesel Electric



Name—WARRIOR
Owner—Tennessee Coal, Iron & R. R. Co.
Builder—Amer. Bridge Co. & Carnegie Steel
Naval Architect—N. L. Van Tol, for owner
Launched—Jan. 4, '29; completed, Jan. 21, '29

HULL PARTICULARS

Length over all, 140 feet 8 inches; length between perpendiculars, 140 feet; breadth molded, 25 feet; depth molded, 9 feet 3 inches; draft, 7 feet; displacement loaded, 575 tons (2000 pounds per ton); net tonnage, 204; bunker diesel fuel oil capacity in tons, 70; speed, 5¼ miles per hour with seven barges.

MACHINERY PARTICULARS

Main Engines—Two diesel solid injection 4-cycle, 6-cylinder engines each developing 550 brake horsepower at 250 revolutions per minute, built by New London Ship & Engine plant of the Electric Boat Co. The bore is 15 inches and the stroke 22 inches.

Main Generators—Two, each of 335 kilowatts, 250-volt direct current, with a 40-kilowatt at 125 volts, direct current exciter attached on an extension of the main generator shaft; built by General Electric Co.; each generator driven by one of the main diesel engines described above.

Electric Motors—Two, double armature, direct current, propulsion motors of 400 shaft horsepower each at 140 revolutions per minute. Control is of the variable voltage type.

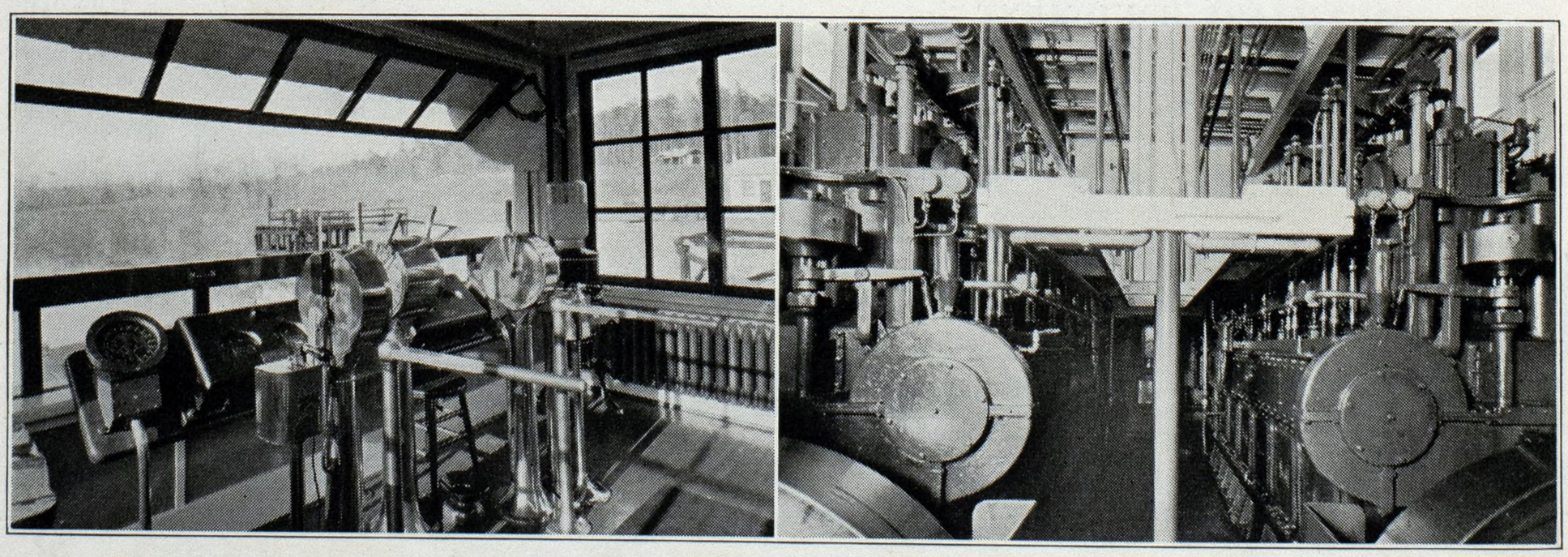
AUXILIARY EQUIPMENT

Pumps—Worthington; and Northern Pump
Capstans—Two, 15 h. p. forward; and two 10 h. p. aft; Pittsburgh Marine Mfg. Co.
Steering Engine—Hydraulic type; two rudders Waterbury Tool Co. & Pittsburgh Marine
Propellers—Dia. 7 ft. 3 in., pitch 8 ft.
Oil Burning Equip.—Donkey Boiler, Todd
Electric Generators—15 k. w. Cummins Diesel General Electric generator
Oil Centrifuge—Sharples Specialty Co.
Thrust Bearings—Kingsbury Machine Works
Storage Batteries—Edison 47 k. w.h.

DESCRIPTION

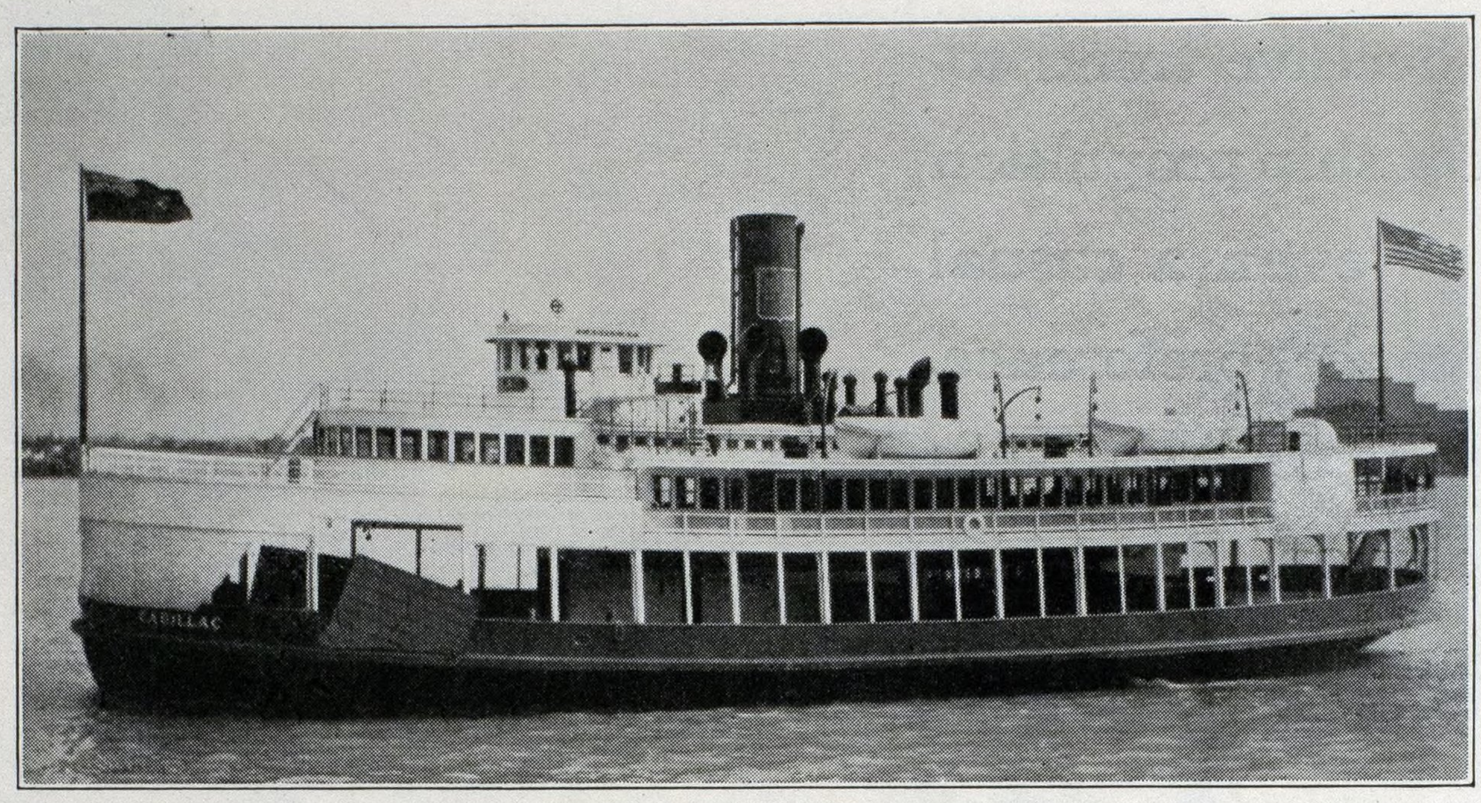
A twin screw tunnel stern, shallow draft diesel electric drive river towboat. This boat is capable of handling seven barges in a tow. The hull and superstructure of the boat is of steel. Two diesel engine generating sets furnish current for two electric propelling motors, each directly connected to a propeller.

In motive power and design the river towboat WARRIOR represents the latest modern development. This towboat is in operation on the Warrior river between Mobile and Birmingport, Ala., a distance of 492 miles. For a considerable part of this distance the river is very winding and the minimum channel depth of 8 feet is maintained by a series of locks and dams. There are in all, 17 locks capable of handling tows 50 feet wide by 280 feet in length at each lockage. Seven barges can be handled in a tow and they are lashed together ahead of the towboat.



Diesel Electric Towboat Warrior. Left—Pilot House. Right—Engine Room; Two Diesel Generators

CADILLAC—Ferry—Lakes—Single Screw—Steam



Name—CADILLAC
Owner—Detroit & Windsor Ferry Co.
Builder—Great Lakes Engineering Works
Naval Architect—Frank E. Kirby
Launch—Mar. 10, '28; completed April 19, '28

HULL PARTICULARS

Length over all, 170 feet 6 inches; length between perpendiculars, 155 feet 8 inches; breadth molded, 56 feet; depth molded, 17 feet 11 inches; draft, 13 feet 3 inches; displacement loaded, 1380 tons (2000 pounds per ton); gross tonnage, 636; net tonnage, 404; passenger capacity, 2500; cargo capacity, 70 automobiles; bunker fuel capacity in tons of coal, 140; speed, 15 miles per hour.

MACHINERY PARTICULARS

Main Engine—One, 3-cylinder compound expansion steam engine, built by Great Lakes Engineering works. Size cylinders, 22 x 32 x 32 inches and 36 inches stroke. Develops 1300 to 1800 maximum indicated horsepower.

Boilers—Two, single ended scotch marine type boilers built by Toledo Shipbuilding Co. Inc. Size, 14 feet in diameter x 10 feet 6 inches long; working pressure 185 pounds per square inch; fuel, coal with cold forced draft.

DESCRIPTION

A single ended ferry for service between Detroit and Windsor, Canada, designed by Frank E. Kirby veteran naval architect of Hudson river and Lake craft. Can handle automobiles and passengers rapidly. The main deck is of steel and is unobstructed to facilitate the movement of automobiles. There is an observation room.

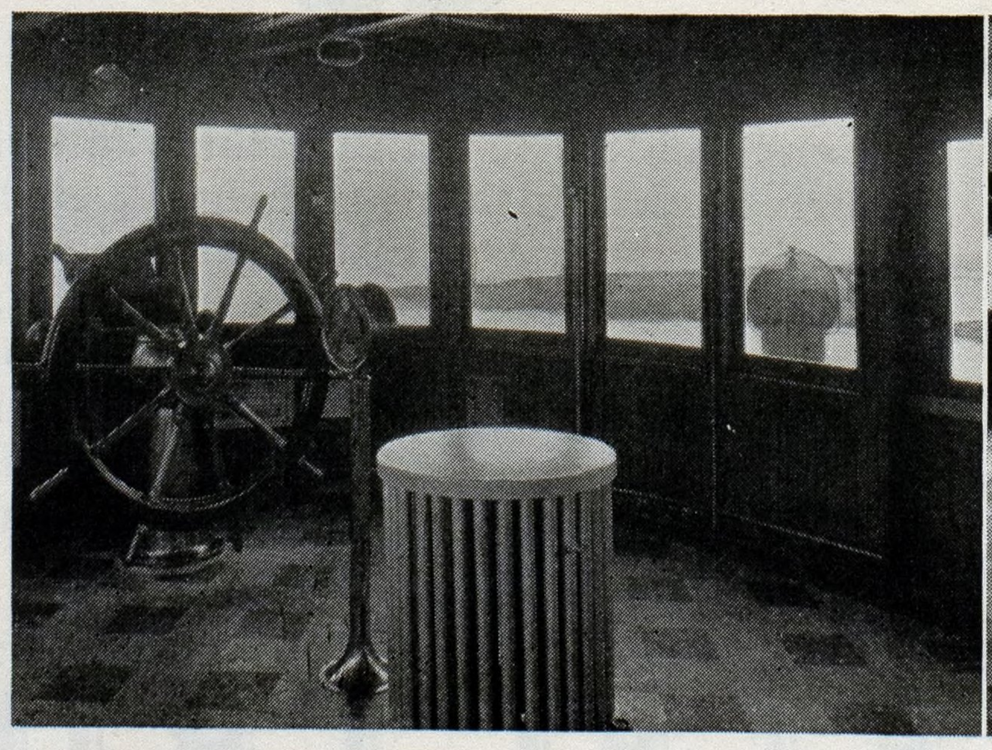
AUXILIARY EQUIPMENT

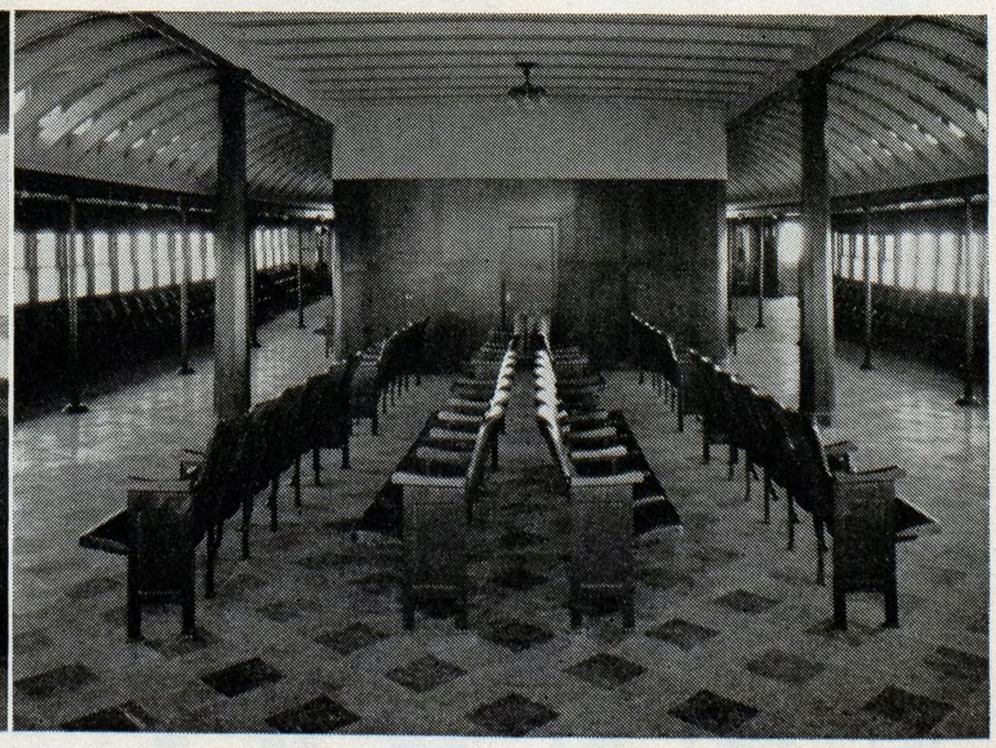
Manufacturers of:

Pumps—Worthington Pump & Mach. Corp.
Windlass—Hyde Windlass Co.
Winches—Dake Engine Co.
Steering Engine—Hyde Windlass Co.
Propellers—Great Lakes Engineering Wks.
Electric Generators—Two 15 k. w. sets, Engberg
Auxiliary Generator—One 5 k. w. Westinghouse
Valves—Leslie, Powell and Crane Co.
Jet Condenser—Worthington Pump & Mach.
Feed Water Heater—Griscom-Russell Co.
Searchlight—Sperry Gyroscope Co.

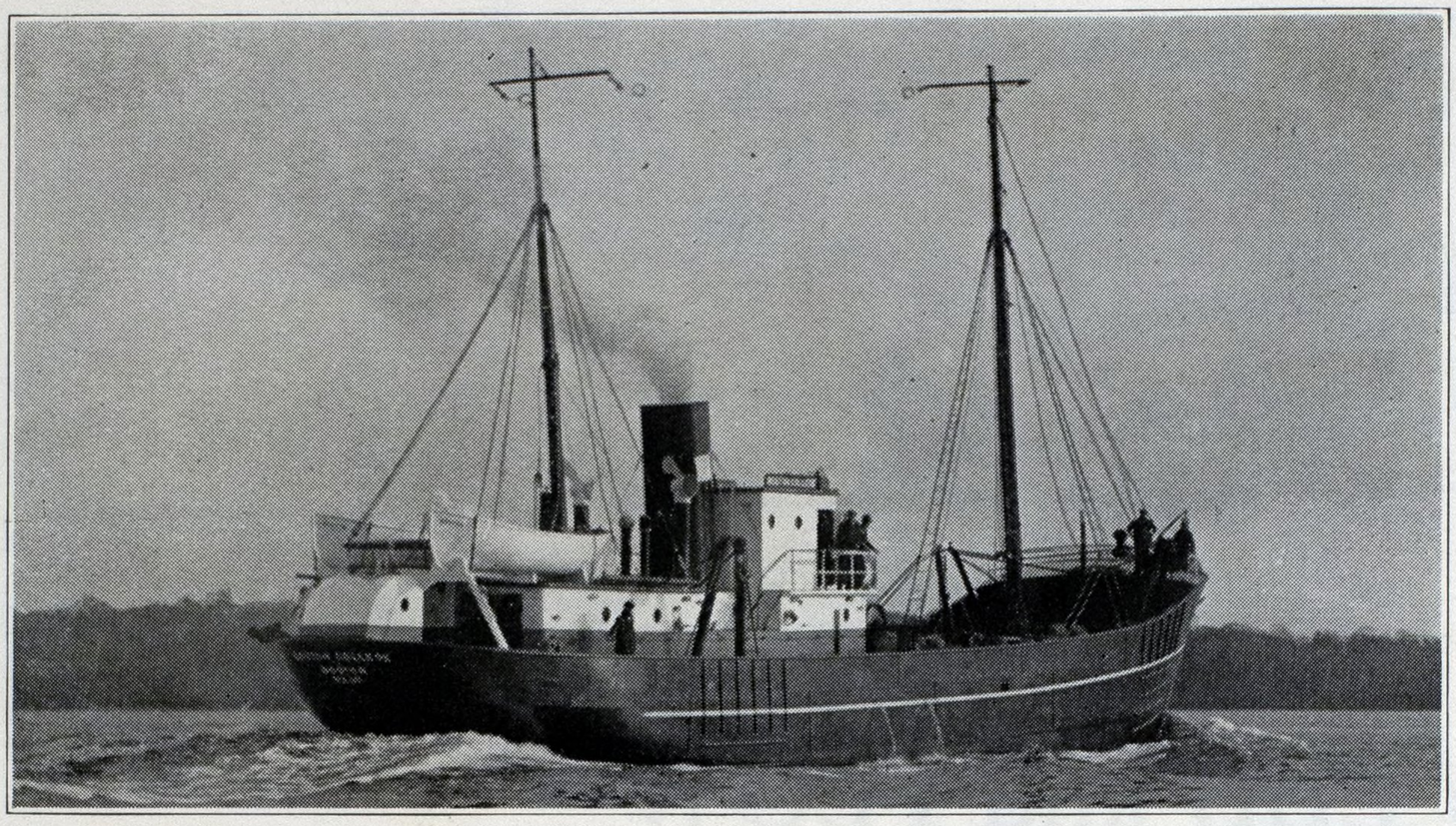
This ferry is similar in general features to the steamer LA SALLE which came out in 1922. All of the passenger decks are floored with United States rubber tile. There is a smoking room for men forward on the promenade deck. The CADILLAC has ample capacity for 70 automobiles and 2500 passengers.

In engineering features this ferry is quite orthodox being propelled by one 3-cylinder vertical compound steam engine with steam supplied by two scotch boilers burning coal. The propeller is solid with four blades and is 11 feet in diameter and 13 feet in pitch.





BOSTON COLLEGE—Beam Trawler—Single Screw—Diesel



Name—BOSTON COLLEGE
Owner—Atlantic & Pacific Fish Co.
Builder—Bath Iron Works Corp.
Naval Architect—Bath Iron Works Corp.
Launched—Oct. 17, '28; completed, Nov. 1, '28
Classification—American Bureau of Shipping
Sister Ships—HOLY CROSS and GEORGETOWN; launched Nov. 24 and Dec. 15, '28; completed, Nov. 27 and December, 1928

HULL PARTICULARS

Length over all, 124 feet; length between perpendiculars, 116 feet; breadth molded, 23 feet; depth molded, 13 feet 6 inches; draft, 10 feet 9 inches; gross tonnage, 241, net tonnage, 111; cargo capacity, about 140 tons of fish and ice; cargo capacity in cubic feet, 7000; bunker diesel fuel oil, capacity in tons, 60; speed, 10½ knots.

MACHINERY PARTICULARS

Main Engine—One, 6-cylinder, 2-cycle, solid injection, single acting Fairbanks Morse diesel engine of 400 brake horsepower at 250 r.p.m.

Boiler—One vertical donkey boiler, built by Orr & Sembrower; fuel, oil.

Auxiliary Oil Engine—One, 4-cylinder Fairbanks-Morse diesel engine 100 horsepower, direct connected to an 80-kilowatt 125-volt generator.

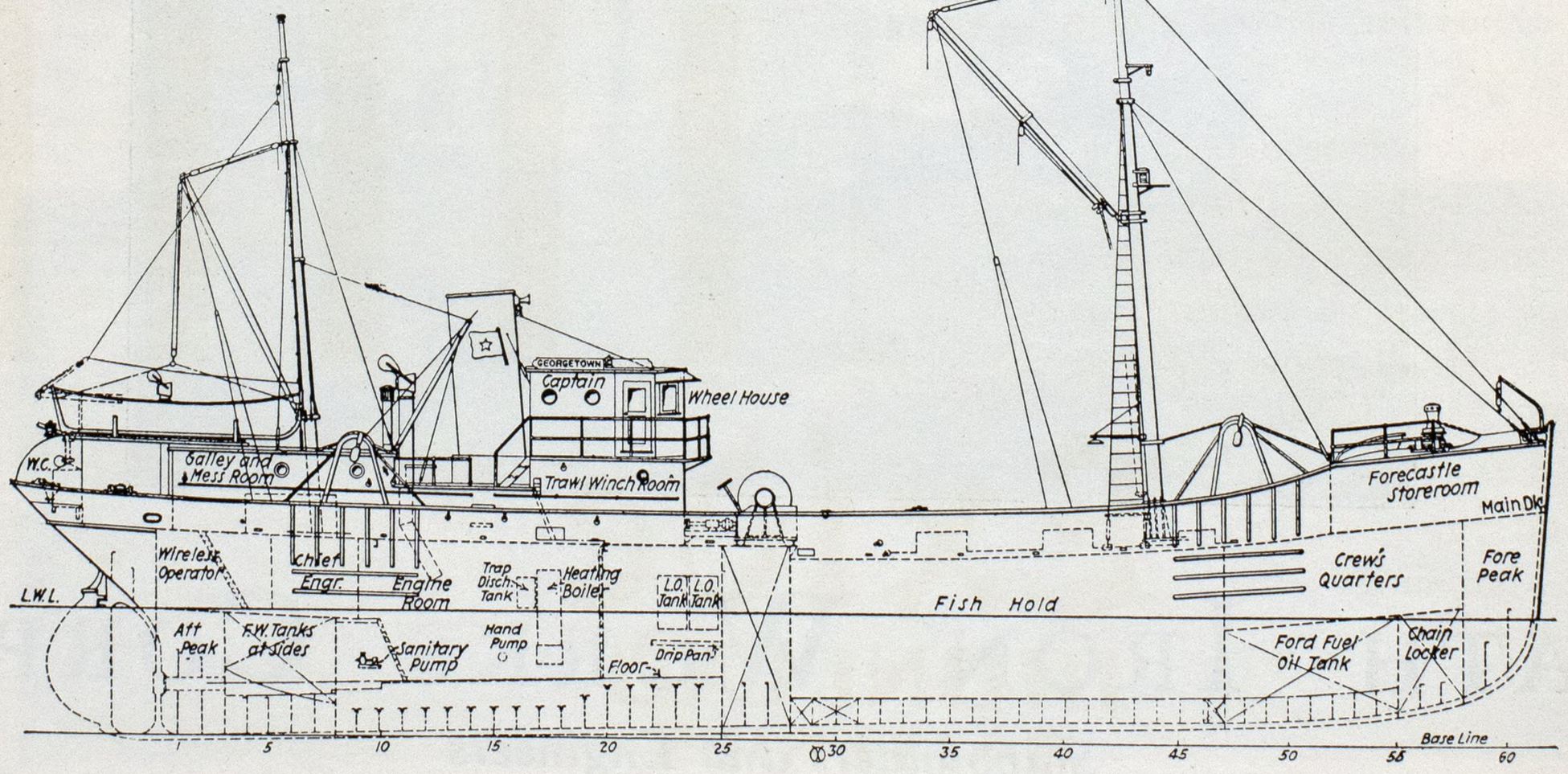
AUXILIARY EQUIPMENT

Pumps—Fairbanks, Morse & Co.
Windlass—Hyde Windlass Co.
Winches—Bromfield's Auxiliary Mfg. Co.
Steering Engine—Edson Mfg. Co.
Propellers—H. G. Trout Co.
Oil Burning Equipment—W. S. Ray Mfg. Co.
Storage Batteries—Edison
Recording Instr.—Leeds & Northrup Co.
Life Sav. Equip.—Welin Davit & Boat Corp.

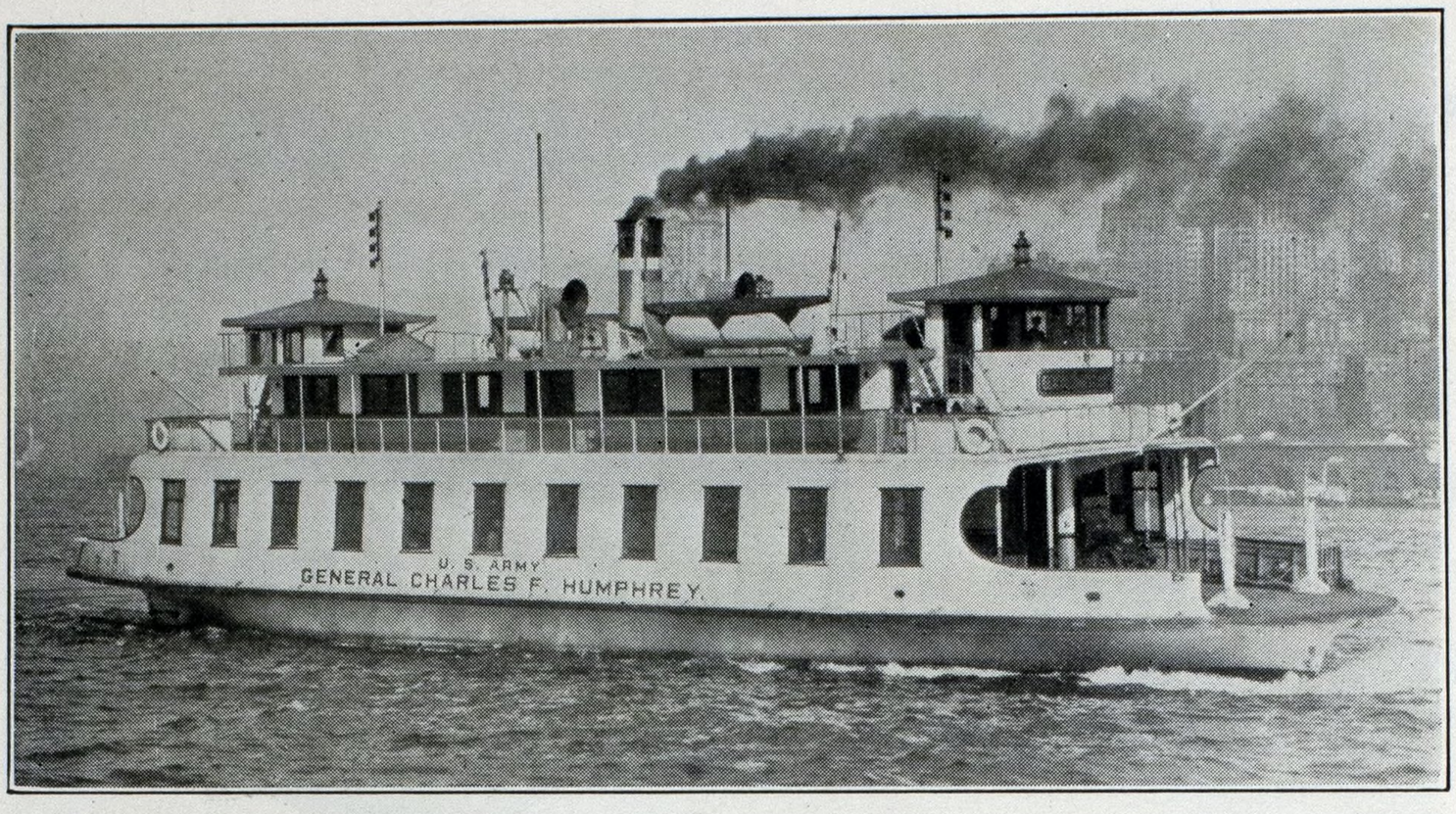
The trawler BOSTON COLLEGE and her sister boats, the HOLY CROSS and the GEORGETOWN, were designed by the Bath Iron Works Corp.

DESCRIPTION

This trawler and her two sister boats are of the otter type, built of steel with close frame spacing to stiffen hull. Steel decks are covered with 3-inch wooden planking. The single diesel engine is located aft. Five steel bulkheads divide the hull transversely. There are two tanks for fresh water built into the hull.



GEN. CHARLES F. HUMPHREY—Ferry—Double Ended—Diesel



Name—General Charles F. Humphrey
Owner—United States War Department
Builder—The Spear Engineers Inc.
Naval Architect—Frank A. Van Vleck
Launched—June 16, '28; completed, Sept. 25, '28
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all over guards, 128 feet; length between perpendiculars at 9 feet 6 inches waterline, 110 feet; breadth molded at 9 feet 6 inches waterline, 34 feet; breadth over guards, 44 feet; depth molded at sides, 14 feet 6 inches; depth molded at center lines midships, 15 feet 2 inches; draft loaded, 9 feet 6 inches; displacement loaded, 560 tons; passenger capacity, 717; automobile capacity, 12 cars; bunker diesel fuel capacity, 5000 gallons; speed, 9½ knots.

MACHINERY PARTICULARS

Main Engine—One, 6-cylinder, 2-cycle, solid injection, single acting diesel engine, rated at 400 horsepower built by Fairbanks, Morse & Co. Cylinder diameter 14 inches, stroke, 17 inches. Located midships and connected through a clutch to a propeller at each end.

Boiler—One donkey boiler of marine water-tube type built by Almy Water Tube Boiler Co. Size, 275 square feet of heating surface; fuel, oil.

Auxiliary Power—Two 30 k. w. Fairbanks, Morse diesel engine generator sets.

AUXILIARY EQUIPMENT

Pumps—Worthington and Fairbanks, Morse
Steering Engine—American Engineering Co.
Propellers—Columbian Bronze Co.
Oil Burning Equipment—Aetna burners
Electric Generators—Fairbanks, Morse & Co.
Auxiliary Air Compressor—Worthington
Electric Motors—General Electric

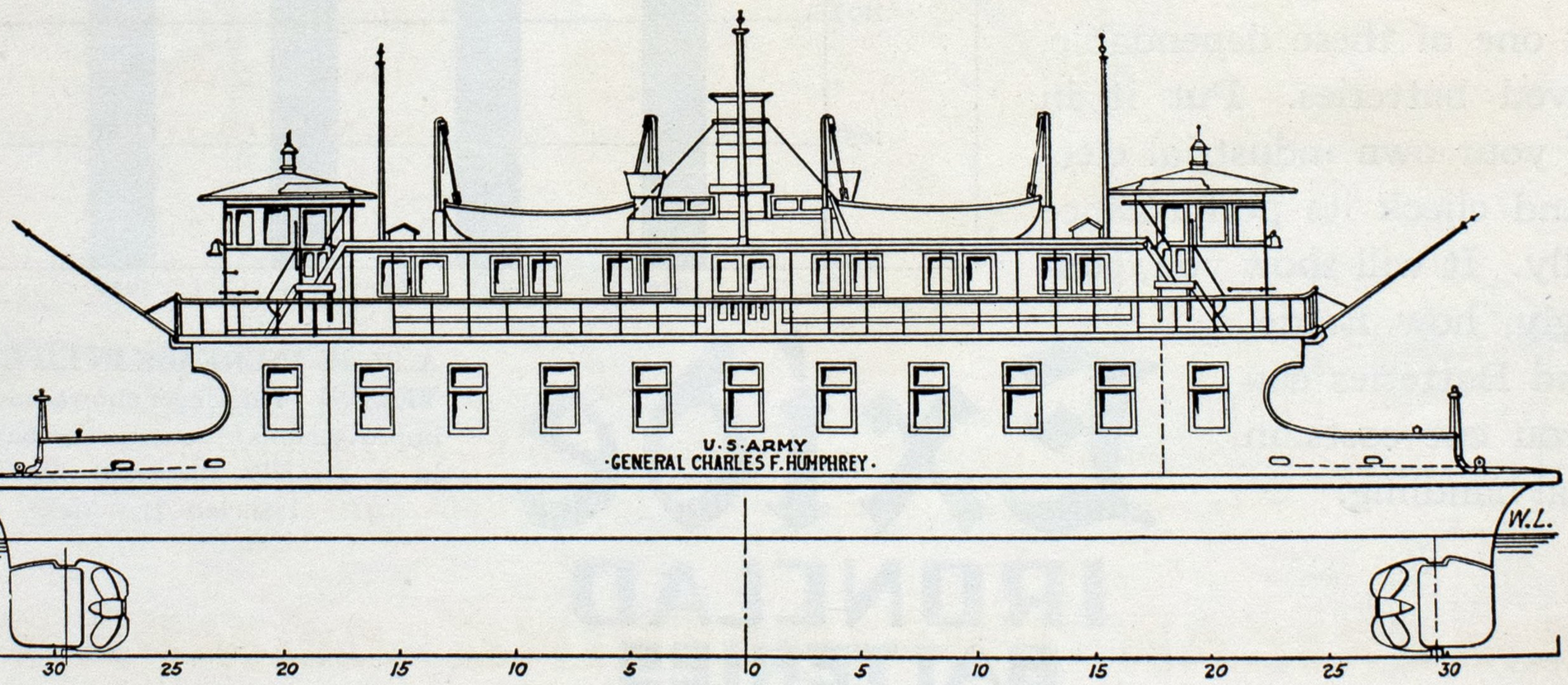
The ferry General Charles F. Humphrey is used by the United States army in maintaining a service in New York harbor between Governors Island and the Battery. The hull is of all steel construction and is double ended in design. Lines are flared to sponsoned deck.

On the saloon deck which is fitted as a promenade is located the cabin, completely equipped for officers' accommodations.

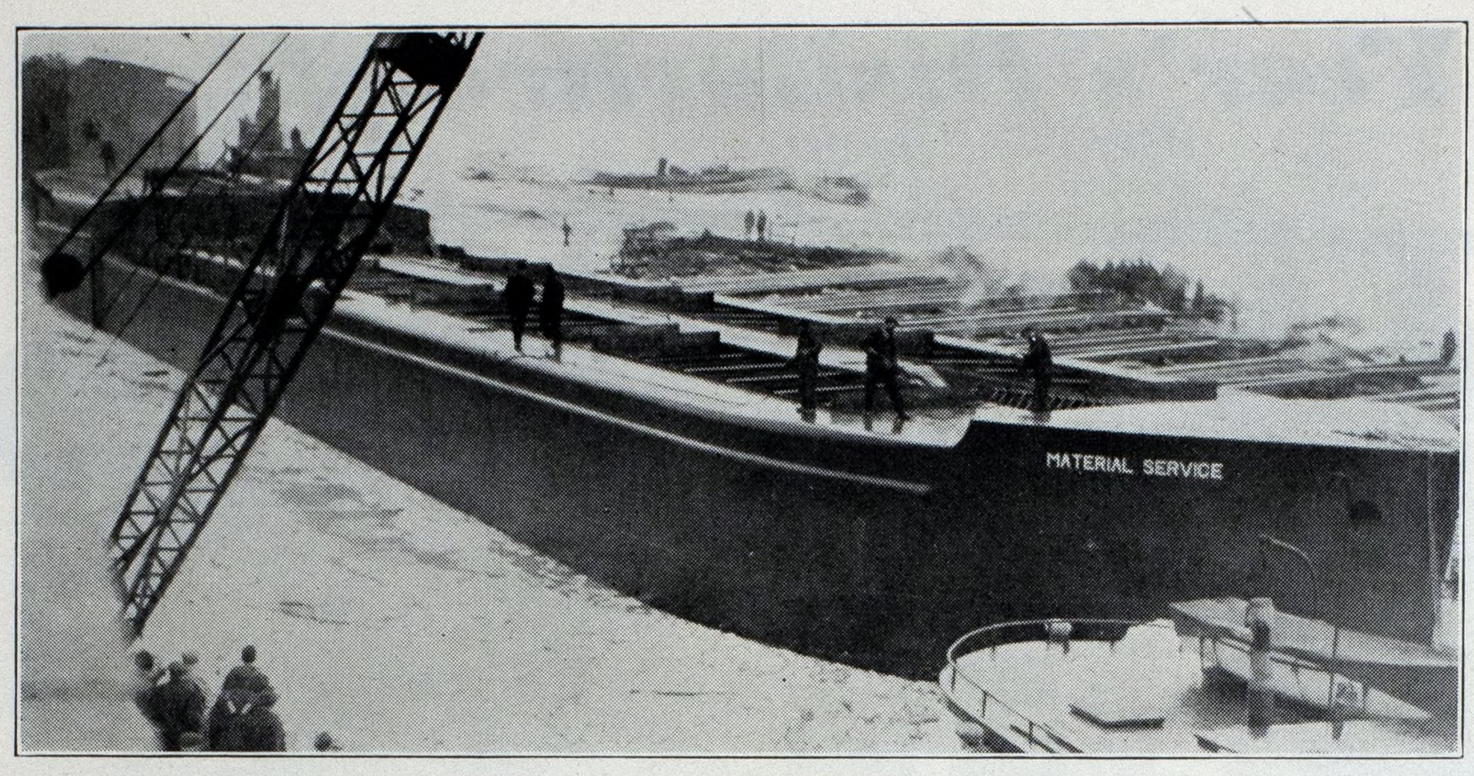
There is a separate pilot house located at each end of the vessel.

DESCRIPTION

This vessel is an all steel double ended ferry especially designed for service in New York harbor between Governors Island and Battery Park. Operated by the quartermaster's corps, United States army. There are two automobile runways on the main deck and side cabins for enlisted personnel. There is capacity for twelve automobiles.



MATERIAL SERVICE—Unloader—Twin Screw—Lakes, Rivers—Diesel



Name—Material Service
Owner—Leathem Smith—Putnam Navig. Co.
Builder—Leathem D. Smith Dock Co.
Naval Architect—Leathem D. Smith Dock Co.
Launched—March 1, '29; completed, April, '29
Class—Am. Bureau A-1—Rivers, Lakes

HULL PARTICULARS

Length over all, 246 feet; length between perpendiculars, 240 feet; breadth molded, 40 feet; depth molded, 15 feet; draft loaded, 12 feet 6 inches; displacement loaded, 3200 short tons; gross tonnage, about 1200; cargo capacity in short tons, 2400; bunker diesel fuel oil, capacity in tons, 50; speed, 10½ miles per hour.

MACHINERY PARTICULARS

Main Engines—Power for propelling and for loading and unloading this vessel is furnished by two, 6-cylinder, 4-cycle, air injection, trunk piston, Winton diesel engines. The cylinders are 14 inches in diameter, the stroke is 16 inches and each engine develops 350 brake horsepower at 250 revolutions per minute. Each engine is direct reversible, is known as Model 115 A and weighs 42,000 pounds. The engines are arranged for a twin-screw installation, one port and one starboard with operating platform between. It is understood that there is a gear transmission to the propeller shaft; also that each engine can be disengaged from its respective propeller shaft so that one can be used by means of Texrope drive for operating the loading and unloading machinery and the other for driving a dredging pump.

Boilers—One, oil fired boiler for heating purposes and for operating the steering engine.

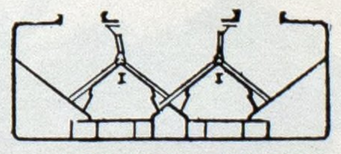
AUXILIARY EQUIPMENT

Pumps—Centrifugal, Morris Machine Wks.
Windlasses—Clyde, Superior Iron Works
Steering Engine—Great Lakes Towing Co.
Propellers—H. G. Trout
Refrigeration—Kelvinator
Electric Generators—Allis Chalmers

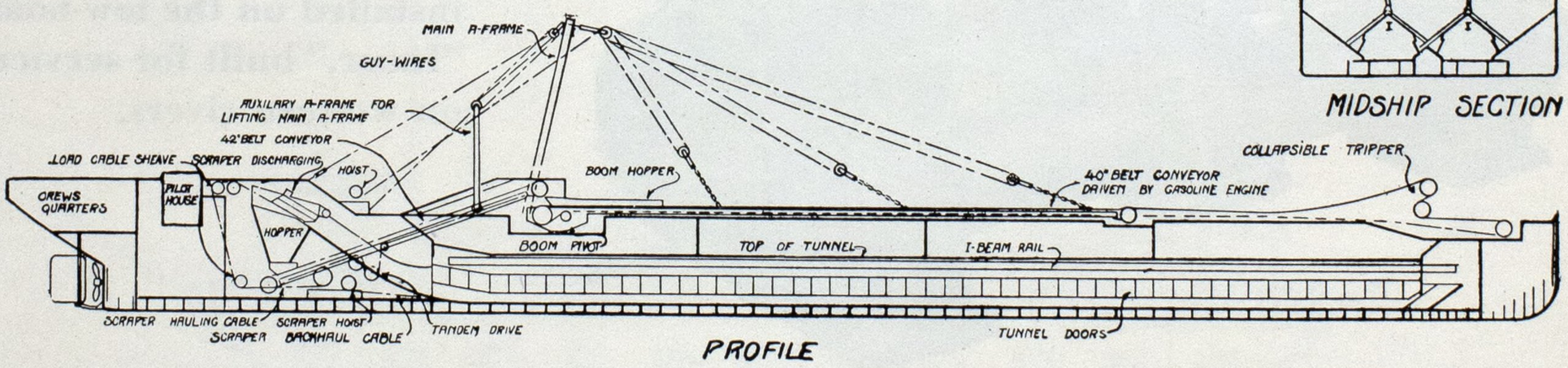
The self unloading feature consists of two 4-yard scrapers delivering to an inclined conveyor and a 90-foot boom conveyor with a jack knife A frame so that it can be stowed on the deck while passing under bridges. The unloading gear is driven from the forward end of the port propelling engine by means of clutches.

DESCRIPTION

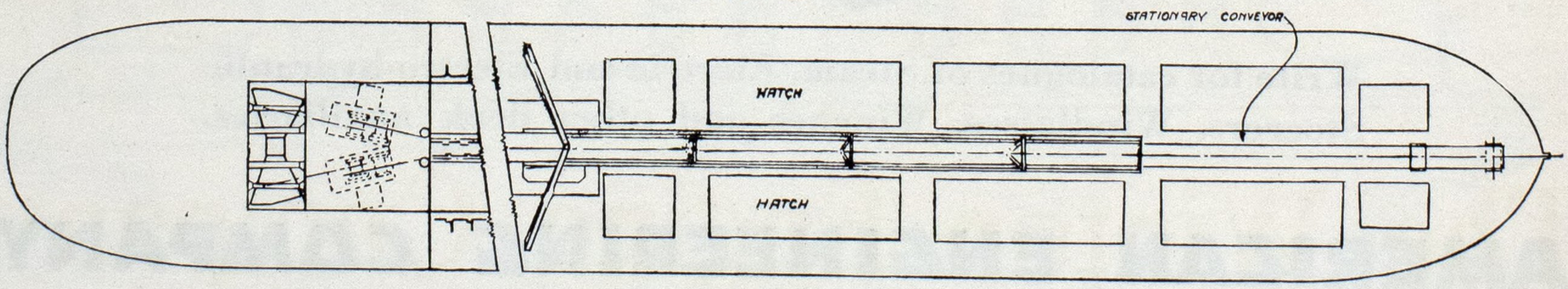
This vessel is unique. She is a twin screw, self-propelled, self-unloading and also self-loading, diesel drive, combination river and lake boat, especially designed to go under low clearance bridges. The minimum height is 14 feet 6 inches when the vessel is in ballast. Sand and gravel will be delivered to docks at Chicago.



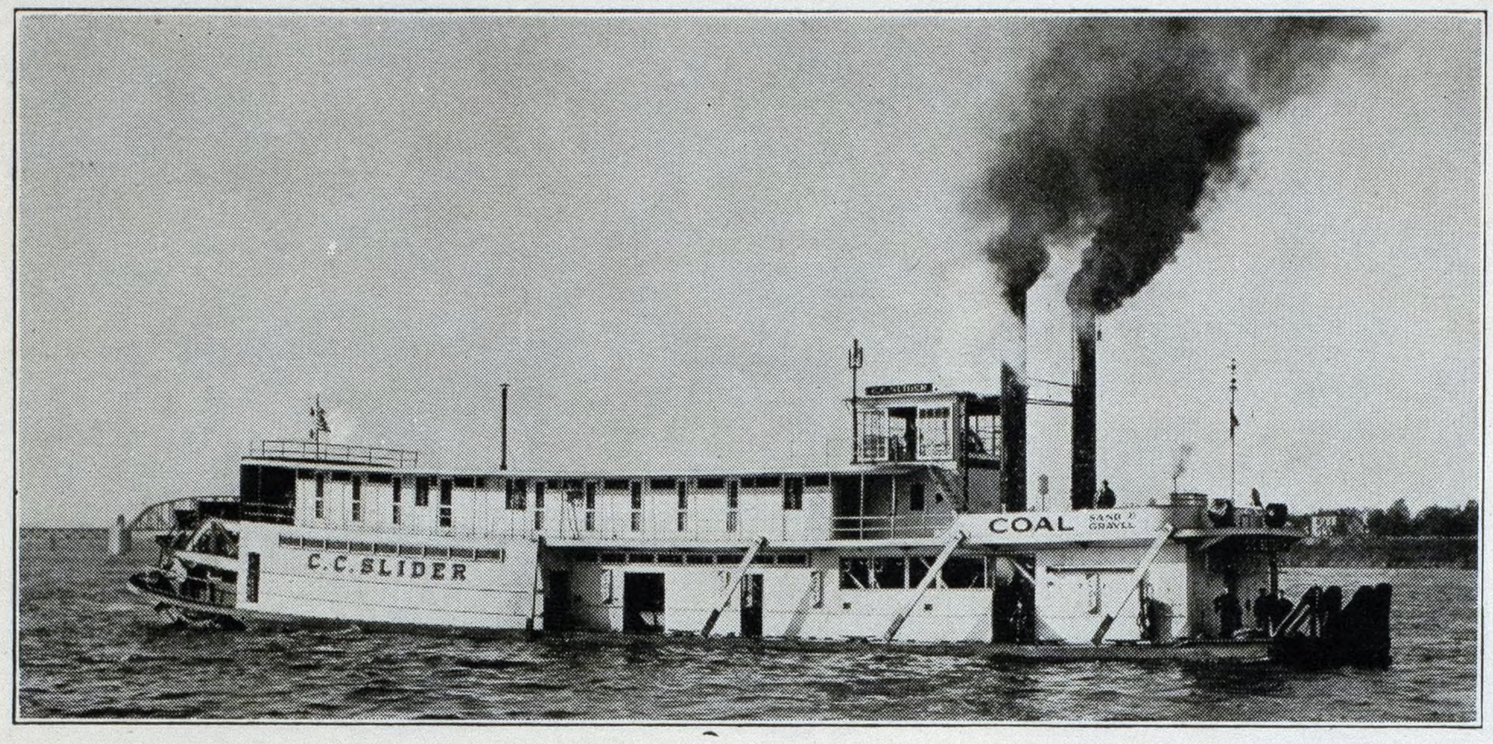
MIDSHIP SECTION



PROFILE



C. C. SLIDER—River Towboat—Stern Wheel—Steam



Name—C. C. SLIDER
Owner—E. T. Slider
Builder—Midland Barge Co.
Naval Architect—Midland Barge Co.
Launched—June 14, '28; completed, Oct. 24, '28

HULL PARTICULARS

Length over all, 168 feet 6 inches; length between perpendiculars, 145 feet; breadth molded, 32 feet; depth molded, 5 feet 6 inches; draft, 4 feet 3 inches; displacement loaded, 540 short tons; gross tonnage, 371; net tonnage, 371; number of crew, 14; berth accommodations, 22; bunker fuel capacity of coal is 70 tons.

MACHINERY PARTICULARS

Main Engines—Two, tandem compound steam engines built by Marietta Mfg. Co. Diameter high pressure cylinder, 14 inches; diameter low pressure cylinder, 28 inches; and a common stroke of 7 feet even. The indicated horsepower is about 578. Each engine is connected to an outboard crank on the stern wheel by steel Pitmans.

Boilers—Four boilers of Western rivers return tube type are fitted. These boilers were built by Peter Jensen Co. and are 44 inches in diameter by 22 feet long. Coal is used as fuel. No superheaters are fitted.

DESCRIPTION

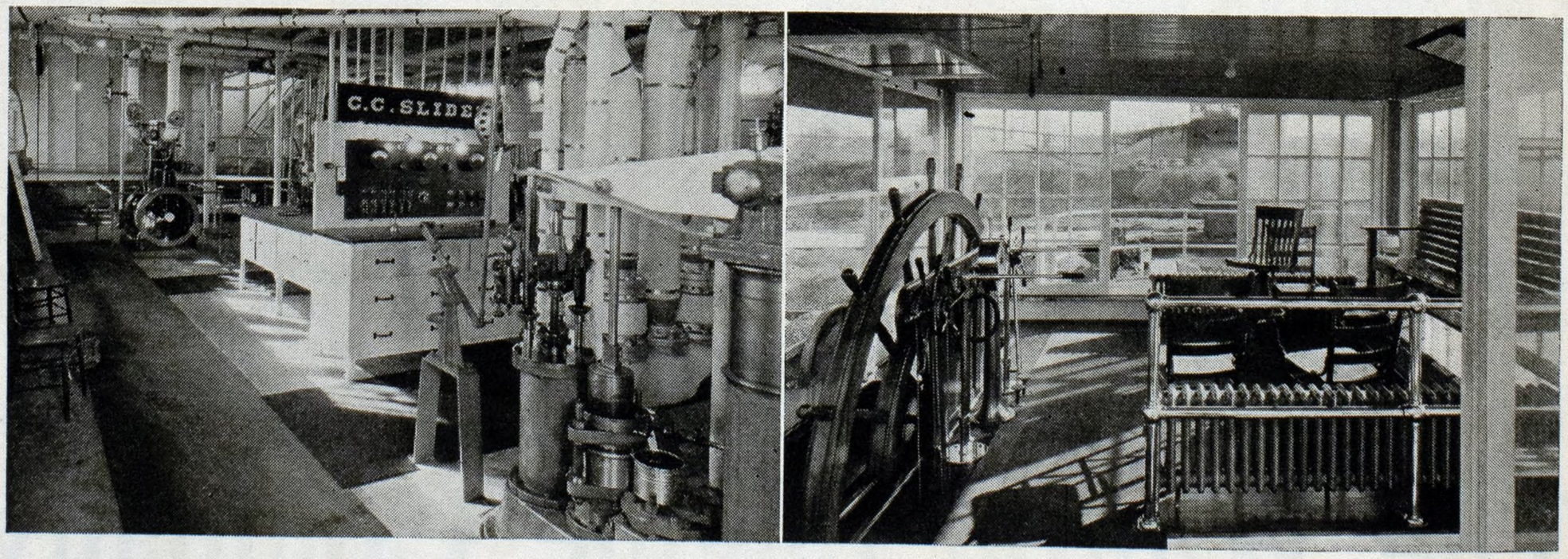
A modern river towboat propelled by a stern wheel driven by two tandem compound steam engines. This boat is used in towing coal and sand barges on the Ohio river in the neighborhood of Louisville. Trips average about 20 miles. This boat was completed late last fall and has given entirely satisfactory service.

AUXILIARY EQUIPMENT

Pumps—Worthington and Shelton
Winches—Marietta Mfg. Co.
Steering Engine—Gardner Fdry. & Mach. Co.
Refrigeration—Brunswick-Kroeschell Co.
Electric Generators—One 3½ k.w. Engberg

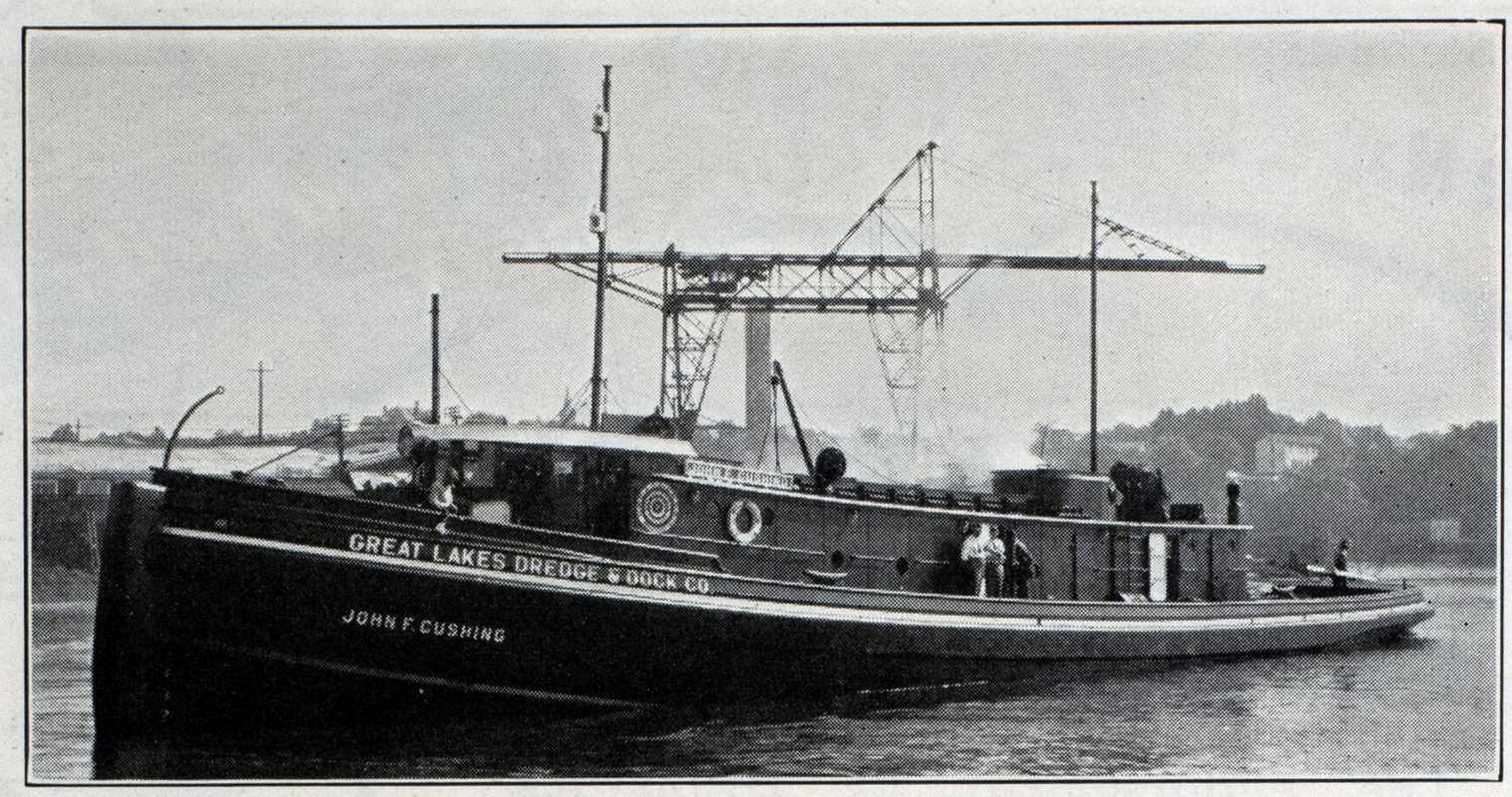
The river towboat C. C. SLIDER is built throughout of steel. Benches and lockers in the engine room are built of light gage steel. Though the machinery is of more or less conservative river practice every precaution has been taken to make it efficient. Steam lines are very thoroughly lagged. The engine room is laid out to give good ventilation and plenty of room. No expense has been spared to make an orderly and shipshape job throughout. In fact the interior of the engine room is pleasing to the engineer and also to the layman.

The spacious pilot house on the C. C. SLIDER is walled in practically entirely by sliding windows the full height from floor to ceiling. Life in this pilot house, it would seem, might be very pleasant. Accommodations for officers and crew are also particularly comfortable and attractive on this boat. There has been a definite attempt to make this new river towboat an outstanding example of mechanical efficiency.



River Towboat C. C. Slider. Left—Engine Room. Right—Pilot House

JOHN F. CUSHING—Lakes Tug—Single Screw—Diesel



Name—JOHN F. CUSHING
Owner—Great Lakes Dredge & Dock Co.
Builder—Manitowoc Shipbuilding Corp.
Naval Architect—Owner and Builder
Launched—April 16, '28; completed July, 1928

HULL PARTICULARS

Length over all, 125 feet 10 inches; length between perpendiculars, 113 feet 3 inches; breadth molded, 27 feet; depth molded, 16 feet 2 inches; draft, 15 feet; displacement loaded, 730.7 tons (2000 pounds a ton); gross tonnage, 301; net tonnage, 205; bunker diesel fuel oil capacity, 28,000 gallons; radius of action on one fueling, 6000 miles; speed, 12 statute miles

MACHINERY PARTICULARS

Main Engine—One, six-cylinder, two cycle, air injection, single acting, crosshead type, direct reversing, diesel engine built by Busch-Sulzer Bros. Diesel Engine Co. Size, diameter cylinders, 17 inches; stroke 27 inches; 1000 brake horsepower at 165 revolutions per minute. Scavenging pump and three-stage air compressor attached. Scavenging by Sulzer double port system. Bearings pressure lubricated. Crank shaft solid steel forging.

Boiler—One for heating purposes, oil burning; with Ray oil burning system.

AUXILIARY EQUIPMENT

Manufacturers of:

Pumps—Fairbanks, Morse & Co.; Blackmer; Schutte-Koerting Co.; and Yeomans Bros.
Windlass—American Engineering Co.
Towing Machine—Lidgerwood Mfg. Co.
Steering Engine—Electric Hydraulic type, American Engineering Co.
Gyro Compass—Sperry Gyroscope Co.
Gyro-Pilot—Sperry Gyroscope Co.
Course Recorder—Sperry Gyroscope Co.
Electric Generators—Two, 60 kilowatts, 125 volts; one 20 kilowatts. All three sets diesel driven. Both engines and generators, Fairbanks-Morse
Air Compressors—Westinghouse Air Brake
Batteries—60-cell type M V S A-13 Exide ironclad for emergency lighting, marine radio and gyroscope compass control. Supplied by the Electric Storage Battery Co.
Anchors—Baldt Anchor Chain & Forge Corp.
Reduction Gears—The Falk Corp.
Thrust Bearing—Kingsbury Machine Works.

DESCRIPTION

A large powerful all steel diesel tug for service on the Great Lakes in making long tows of barges, dredges and other equipment used in dredging, dock building and water front construction. The superstructure, also of steel construction, has been kept at a minimum height to permit passage under low canal and river bridges.

REMARKS

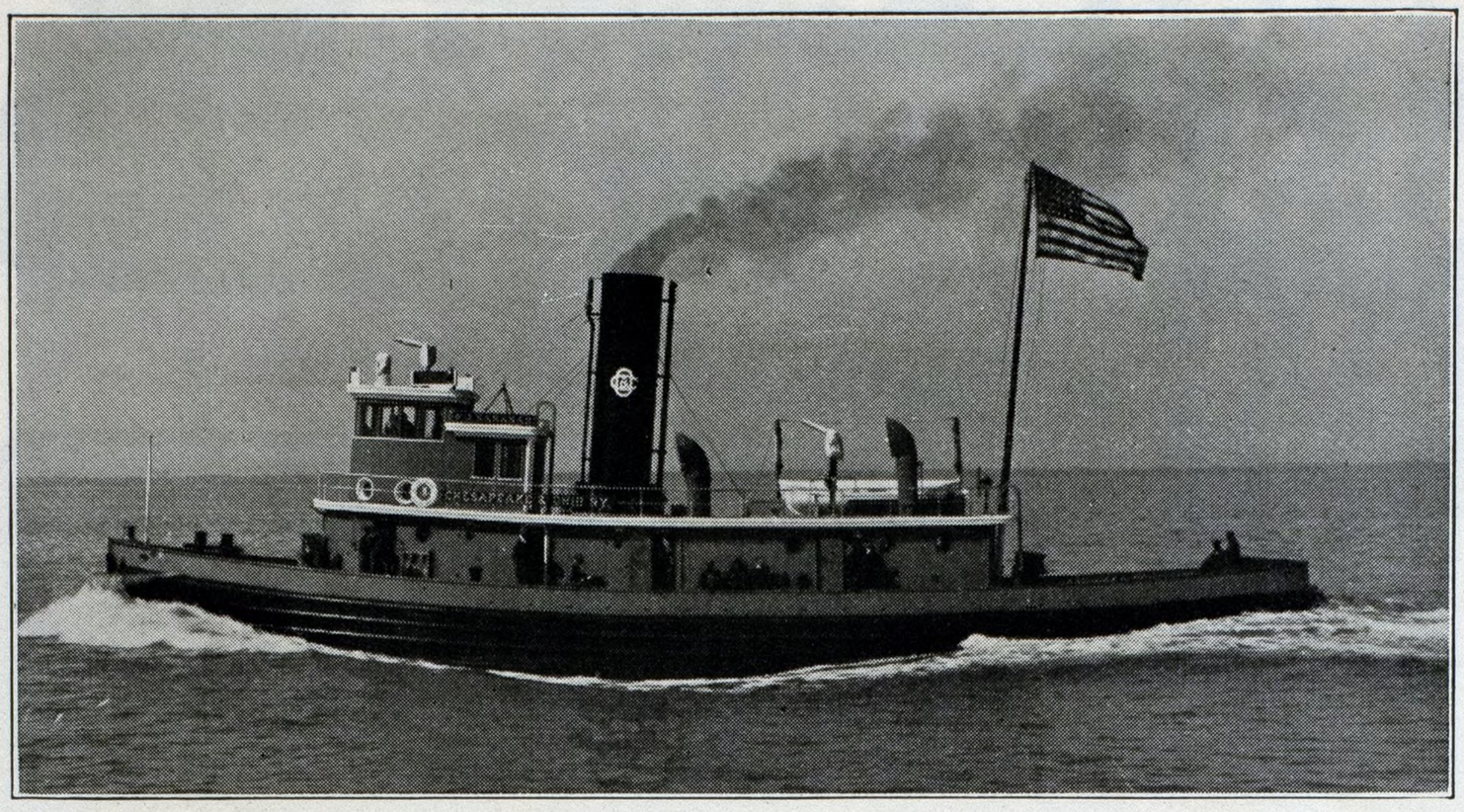
The JOHN F. CUSHING is an able sea going tug and is said to be the largest craft of its type on the Great Lakes. Of heavy steel construction with ample freeboard forward this tug can stand the hardest kind of service in the severest weather. The guards are exceptionally wide and are built of steel.

One of the interesting features is the use of Falk reduction gears and flexible couplings between the powerful main diesel engine and the propeller shaft thus eliminating shocks to the engine and reducing the propeller revolutions to economical towboat practice at the same time retaining the economy, space and weight advantages of the comparatively high speed diesel engine.

A steel house with deck space at sides covers the machinery space and provides galley, messroom and quarters for the personnel. The pilot house at the forward end of this house is but slightly raised above it giving an adequate view while at the same time permitting passage under low bridges such as those over the Chicago river and the New York barge canal.

No expense has been spared in the building of this exceptionally fine vessel to make her an outstanding example of modern marine engineering. No other tug for instance, on the Great Lakes at least, has been equipped with all of the latest proved aids to navigation. The owner has shown a practical progressive attitude and with the builder deserves credit for this fine accomplishment in shipbuilding.

W. J. HARAHAN—Harbor Tug—Single Screw—Steam



Name—W. J. HARAHAN
Owner—Chesapeake & Ohio railroad
Builder—Newport News S. B. & D. D. Co.
Naval Architect—H. F. Norton
Launch—March 31, '28; complete, April 26, '28

HULL PARTICULARS

Length over all, 109 feet 6½ inches; length between perpendiculars, 97 feet; breadth molded, 28 feet; depth molded, 14 feet 6 inches; draft, 10 feet 6 inches forward, and 12 feet 6 inches aft; displacement loaded, 485 tons; gross tonnage, 266; net tonnage, 134; bunker fuel capacity in coal, 85 tons.

MACHINERY PARTICULARS

Main Engine—One, 2-cylinder compound expansion steam engine; size, 20 x 44 inches x 30-inch stroke; indicated horsepower between 900 and 1000 built by Newport News Shipbuilding & Dry Dock Co.

Boiler—One, single ended scotch marine type boiler; size 16 feet in diameter x 12 feet long; total heating surface, 3178 square feet; working steam pressure, 160 pounds per square inch; fuel, coal burned under natural draft.

DESCRIPTION

This vessel is a powerful towboat and also an efficient fire fighter and is now being used by the Chesapeake & Ohio railroad in the harbor of Newport News and in and about Hampton Roads. A steel single screw tug and can be used for shifting carfloats, towing and general harbor work. Placed in service May last year.

AUXILIARY EQUIPMENT

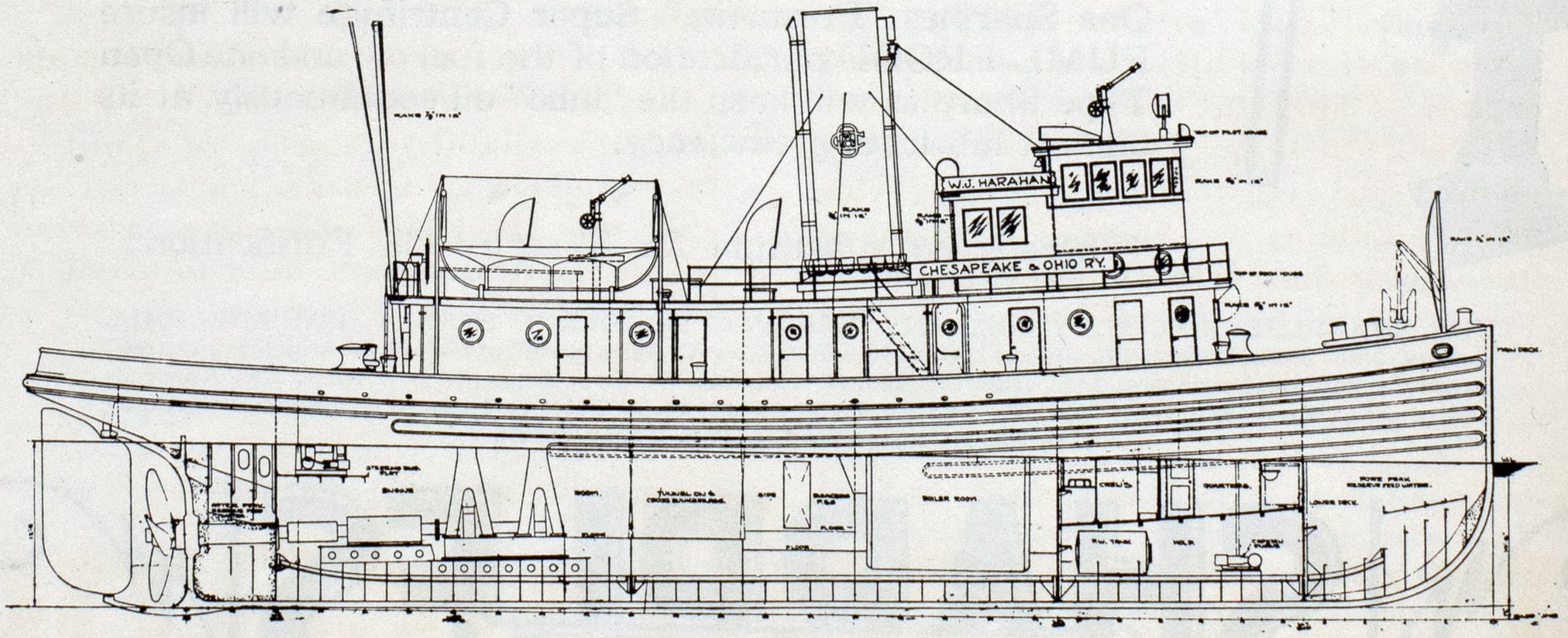
Pumps—Warren Steam Pump Co.
Steering Engine—Hyde Windlass Co.
Propellers—Newport News S. B. & D. D. Co.
Electric Generators—One 5 k.w. Engberg; one 2 k.w. turbo-set, Pyle-National Co.

The tug W. J. HARAHAN was designed at the Newport News Shipbuilding & Dry Dock Co. under the direction of H. F. Norton, naval architect. This vessel is a trim, well proportioned and able seagoing tug, with 1000 horsepower to draw from when necessary.

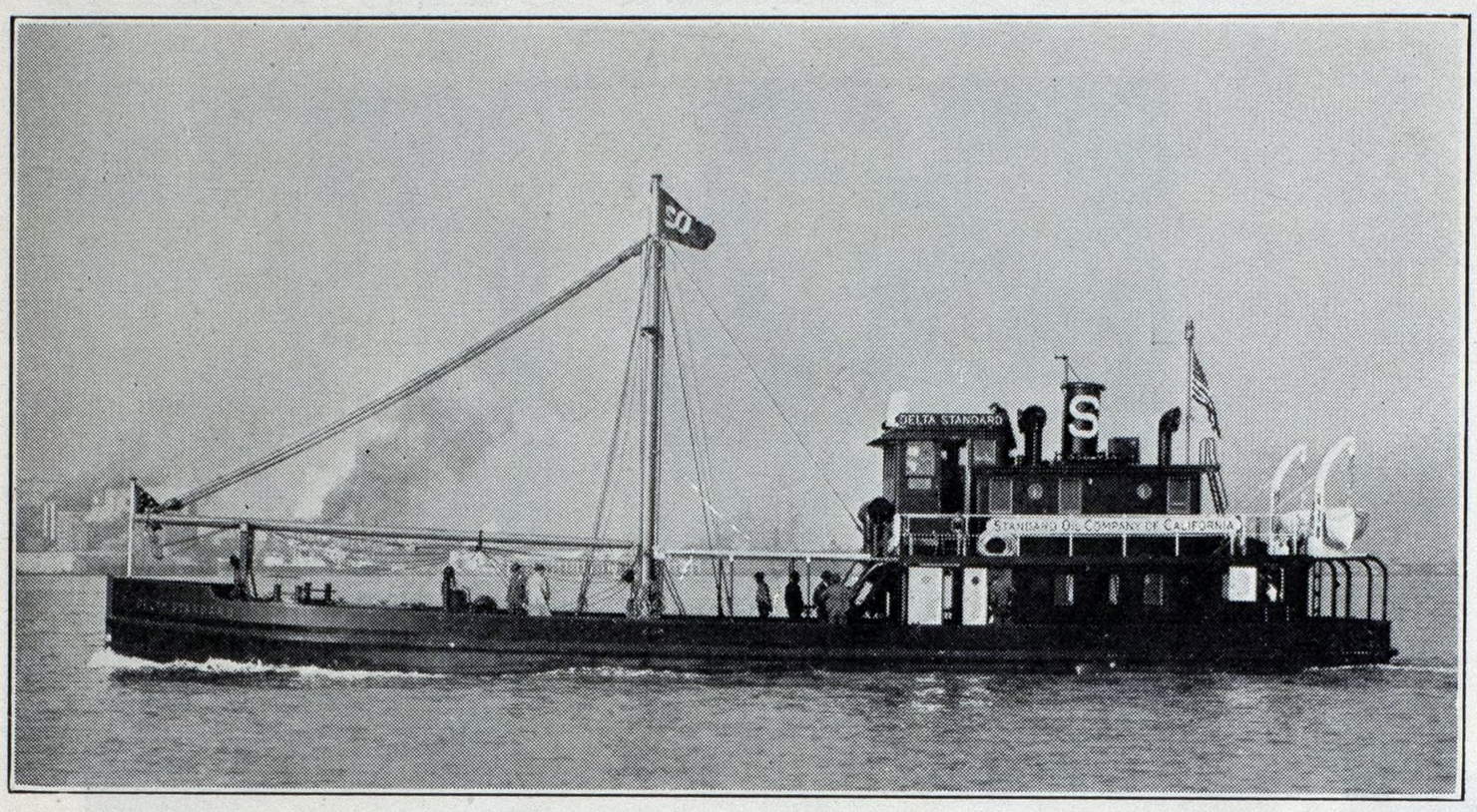
The hull and deck house are of steel throughout. Deck covering was supplied by Selby Battersby Co. The pilot house is built of wood and is sheathed inside with tongue and grooved oak.

All of the bilges including boiler saddles and engine foundation between fore and after peak bulkheads are coated with bituminous solution applied cold. Over this there is a coat of bituminous enamel ¼-inch thick applied hot.

The vessel was built under the inspection of W. T. Newell, supervisor of floating equipment for the Chesapeake & Ohio railroad.



DELTA STANDARD—Tanker—Rivers—Twin Screw—Gas



DESCRIPTION

A twin screw shallow draft gasoline engine driven tanker for use on the Sacramento and San Joaquin rivers, California. Delivers gasoline or distillate and package freight to points on the rivers referred to. High speed engines drive the propellers through reduction gears giving economical propeller revolutions and less weight and space.

Name—Delta Standard
Owner—Standard Oil Co. of California
Builder—Beth. S. B. Corp., Union Plant
Naval Architect—S. O. Co. of California
Launched—Jan. 8, '29; completed Feb. 2, '29
Classification—None

HULL PARTICULARS

Length overall, 101 feet 4 inches; length between perpendiculars, 100 feet; breadth molded, 22 feet; depth molded, 5 feet 9 inches; draft, 4 feet 6 inches; displacement, 206 tons in fresh water; gross tonnage, 111.24; net tonnage, 52; cargo capacity, 23,625 gallons gasoline or distillate, equal to 63.5 tons; also 1482 cubic feet in hold for package freight, equal to 24.6 tons; total cargo deadweight, 88.1 tons; bunker fuel, 2.3 tons; fresh water and stores, 3.5 tons; total deadweight, 93.9 tons; speed, 8.96 knots on trial; service speed, 8 knots.

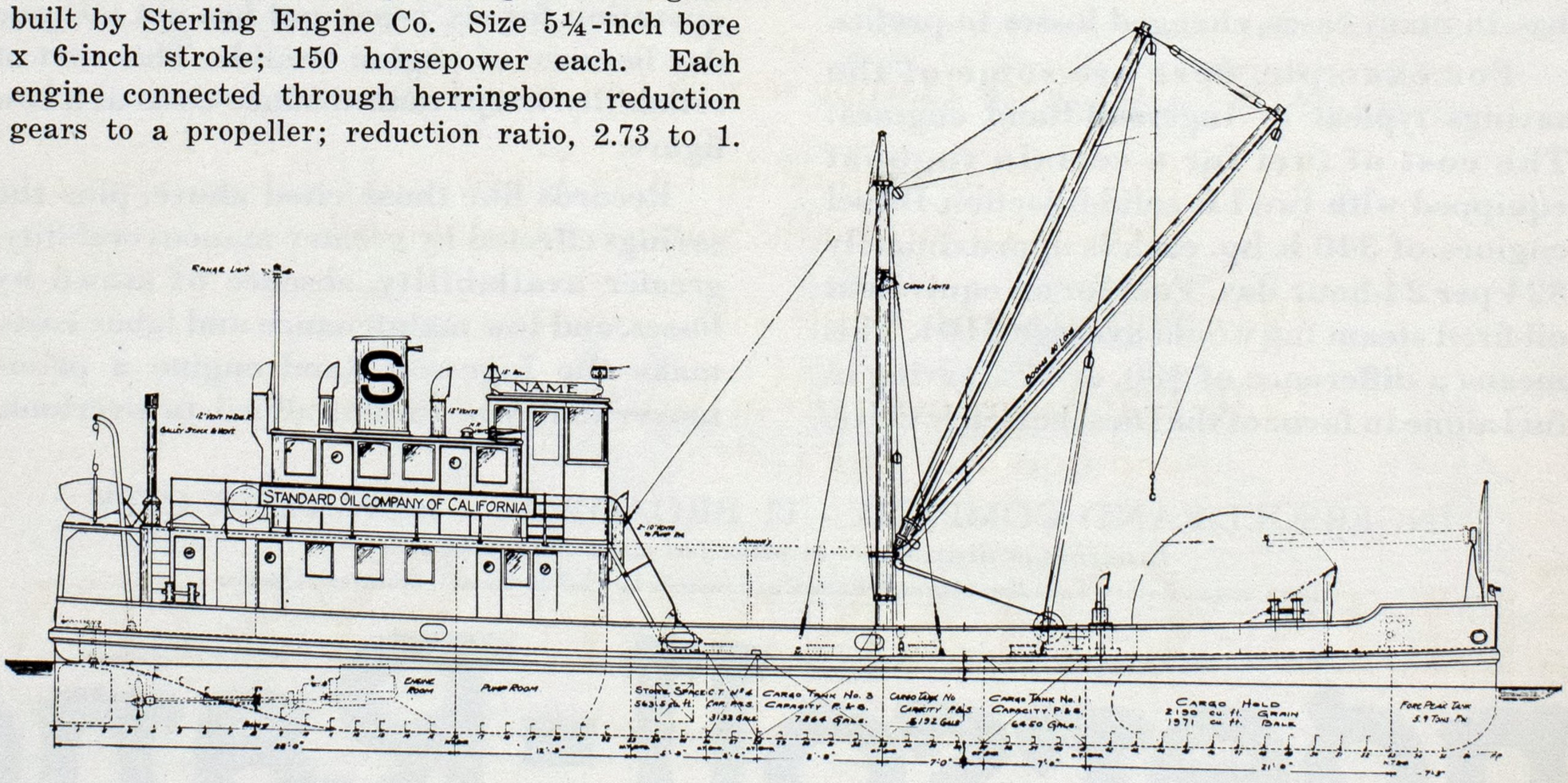
MACHINERY PARTICULARS

Main Engine—Two, 6-cylinder gasoline engines built by Sterling Engine Co. Size 5¼-inch bore x 6-inch stroke; 150 horsepower each. Each engine connected through herringbone reduction gears to a propeller; reduction ratio, 2.73 to 1.

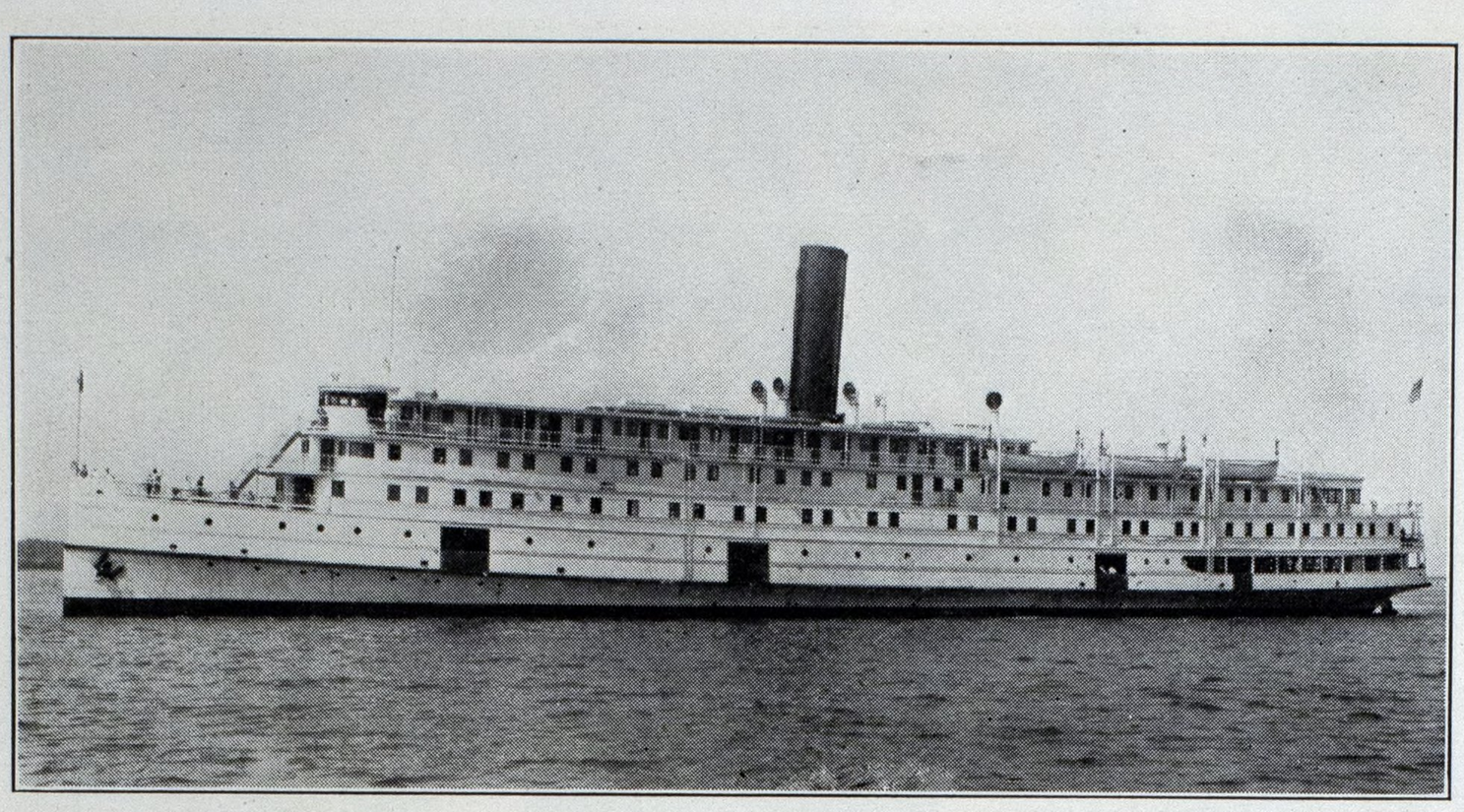
AUXILIARY EQUIPMENT

Pumps—Three cargo and one fire pump all furnished by Kinney Mfg. Co.
Windlass—Hand, Am. Engineering Co.
Winch—10 H. P. Allan Cunningham
Steering—Hand gear only
Propellers—Union Plant, Beth. S. B.
Electric Generators—Diehl Mfg. Co.
Generator Engine—40 h. p. Novo
Winch Engine—10 h. p. Novo

This vessel is of special interest in that relatively high speed engines have been used to drive the propellers through reduction gears. While this is somewhat of a new departure good results are expected in economy in saving of weight and space due to the use of lighter and smaller engines for equal power. Particulars of this vessel were supplied at the editors request by J. C. Rohlfs, manager of the marine department of the Standard Oil Co.



PRESIDENT WARFIELD—Passenger—Bay—Single Screw—Steam



Name—PRESIDENT WARFIELD
Owner—Baltimore Steam Packet Co.
Builder—The Pusey & Jones Corp.
Naval Architect—The Pusey & Jones Corp.
Launched—Feb. 6, '28; completed, July 12, '28
Classification—American Bureau Shipping

HULL PARTICULARS

Length over all, 330 feet; length between perpendiculars, 320 feet; breadth molded at main deck, 56 feet 6 inches; depth molded, 18 feet 6 inches; draft mean loaded, 14 feet 6 inches; displacement loaded in salt water, 2960 tons; gross tonnage, 1814; net tonnage, 706; passenger capacity, 510 first class and 21 second class; cargo capacity in cubic feet, 82,526; bunker fuel capacity in tons of coal, 118; speed, 19½ miles per hour.

MACHINERY PARTICULARS

Main Engine—One triple expansion 4-cylinder surface condensing steam engine; size, 24½ x 40 x 47 x 47 inches x 42-inch stroke, rated at about 2600 indicated horsepower; built by the Pusey & Jones Corp.

Boilers—Four, scotch marine type; size, 13 feet 3 inches inside diameter and 11 feet 6 inches overhead; total heating surface, 2093 square feet; built by the Pusey & Jones Corp.; fuel, coal.

DESCRIPTION

A finely modeled steel hull with sponsoned main deck to give space for accommodations in superstructure. This vessel is a duplicate of the STATE OF MARYLAND and STATE OF VIRGINIA, also built by the same company for service between Baltimore and Norfolk. A distinctly American design gradually developed by operating experience.

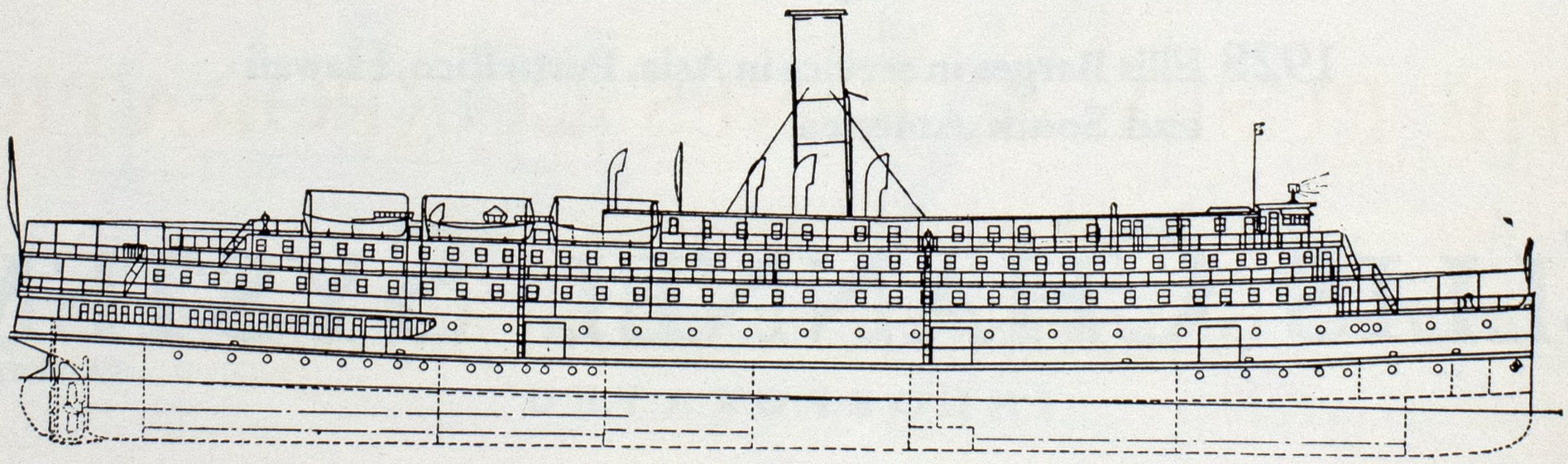
AUXILIARY EQUIPMENT

Manufacturers of:
Pumps—Warren Steam Pump Co.
Windlass—Hyde Windlass Co.
Winches—Hyde Windlass Co.
Steering Engine—Hyde Windlass Co.
Propellers—Hyde Windlass Co.
Refrig.—Brunswick-Kroeschell, Remington
Electric Generators—Two 40 k. w. Engberg
Anchors—Baldt Anchor, Chain & Forge Corp.
Rudder—Oertz Streamline Rudder Corp.

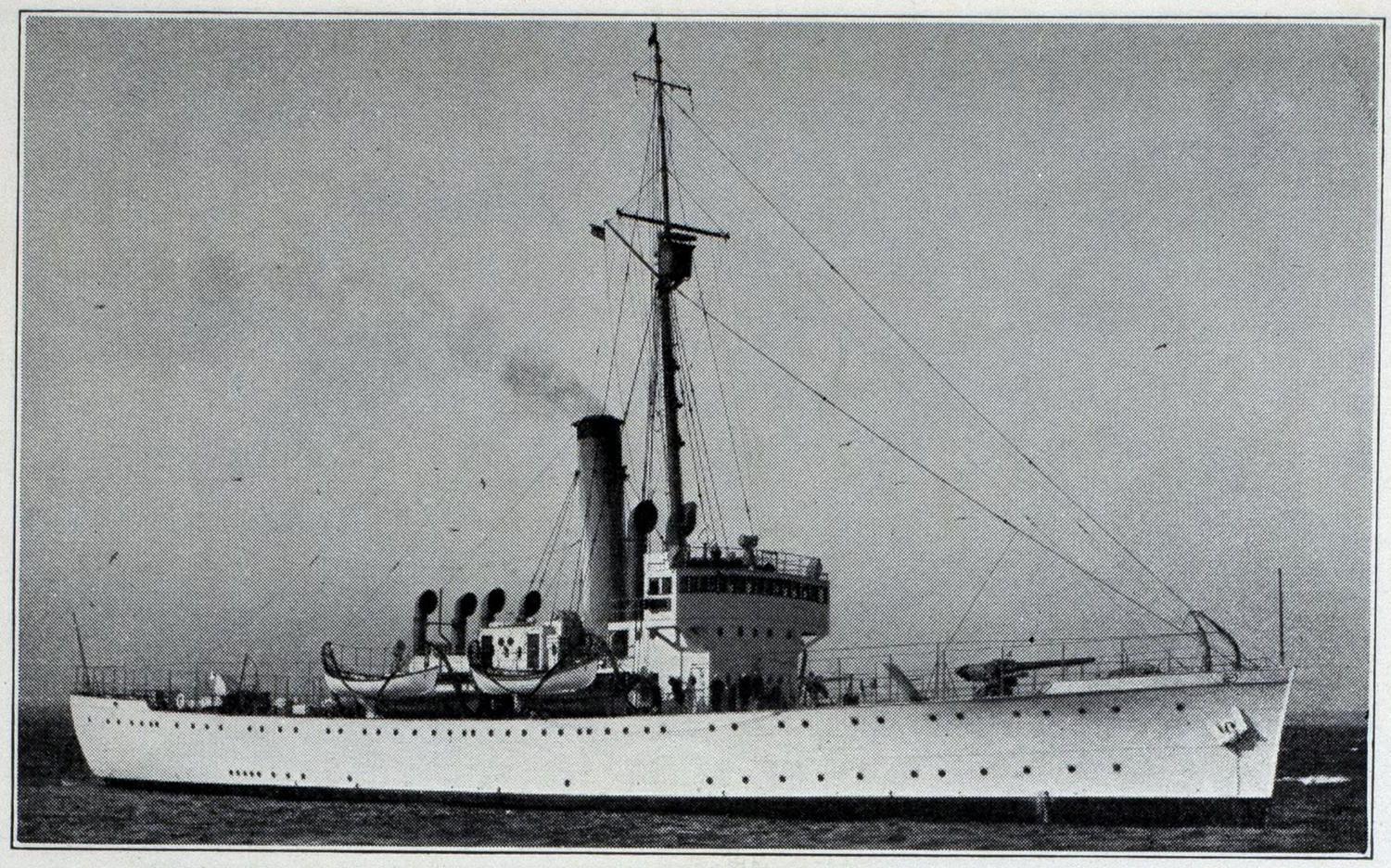
The PRESIDENT WARFIELD may be considered conservative in design. Steam is furnished to a triple expansion engine by scotch type of marine boilers, coal fired. Service experience with her two sister ships has been satisfactory to the owner and there seemed to be no good reason for making a change. The streamline rudder is a new feature and trials demonstrated its efficiency in increasing speed or reducing power for same speed.

Deck covering, which is of great importance in a vessel of this type with a large and daily changing passenger list, and handling of freight has been supplied by Selby, Battersby & Co. and the Goodyear Tire & Rubber Co.

Freight including automobiles is handled through three large side ports giving access to the main deck.



CHELAN AND CLASS—Coast Guard Cutter—Single Screw—Electric



Name—CHELAN
Owner—United States Coast Guard
Builder—Beth. S. B. Corp. Fore River Plant
Naval Architect—United States Coast Guard
Launched—May 19, '28; completed, Aug. 20, '28
Sister Ships—PONTCHARTRAIN, TAHOE, CHAMPLAIN and MENDOTA, launched in order as follows: June 16, July 12, Oct. 11, Nov. 27, 1928; completed in order as follows: Oct. 10, Oct. 31, '28; Jan. 12, March 16, '29

HULL PARTICULARS

Length over all, 250 feet; length between perpendiculars, 236 feet; breadth molded, 42 feet; depth molded, 26 feet 10 inches; draft, 15 feet; displacement loaded, 2075 tons; bunker fuel oil capacity, 90,000 gallons, sufficient for a cruising radius of about 8000 miles; speed developed on the trials, 17.3 knots; speed normal under ordinary conditions 16 knots.

MACHINERY PARTICULARS

Main Engine—One steam turbine direct connected to an A.C. generator. A synchronous motor secured to the propeller shaft. The turbine is designed for 3600 revolutions per minute at full speed with an output of 2500 kilowatts at 2300 volts from the generator. Both turbine and generator designed and built by Westinghouse Electric & Mfg. Co.

Boilers—Two, Babcock & Wilcox watertube marine boilers with a total heating surface of 5734 square feet and a total superheating surface of 666 square feet in an interdeck superheater; working pressure, 250 pounds per square inch; fuel, oil, Babcock & Wilcox oil burning equipment.

Main Generators—One, A.C. 2500-kilowatt, 2300-volt, 3-phase, 60 cycles at 3600 revolutions per minute, direct connected to main turbine as indicated above. For excitation, two D.C. generators with dual drive, that is induction motor and steam turbine. All furnished by Westinghouse.

Main Motor—One, 3000 shaft horsepower at 163.5 revolutions per minute, synchronous motor connected to the propeller shaft; built by Westinghouse Electric & Mfg. Co.

Auxiliary Diesel Engine—One, 4-cycle, 4-cylinder, Washington-Estep diesel engine of 110 brake horsepower, direct connected to a 50-kilowatt D.C. and a 30-kilowatt A.C. generator mounted in tandem all on a common cast iron sub-base, making a self contained unit.

AUXILIARY EQUIPMENT

Pumps—Warren, Worthington, Quimby
Windlass—Moore Plant, Beth. S. B. Corp.
Winches—Capstan, Bethlehem
Steering Engine—Bethlehem, Waterbury Tool
Propellers—Fore River Plant, Beth. S. B. Corp.
Refrigeration—Brunswick-Kroeschell Co.
Electric Motors; Controls—Westinghouse
Evaporators, Heaters—Davis Engineering Corp.
Revolution Counters—Cummings Machine Wks.
Anchors—Baldt Anchor Chain & Forge Corp.
Turbine Oil Pumps—Kearfott Engineering Co.
Windows—Kearfott Engineering Co.
Thrust Bearings—Kingsbury Machine Works

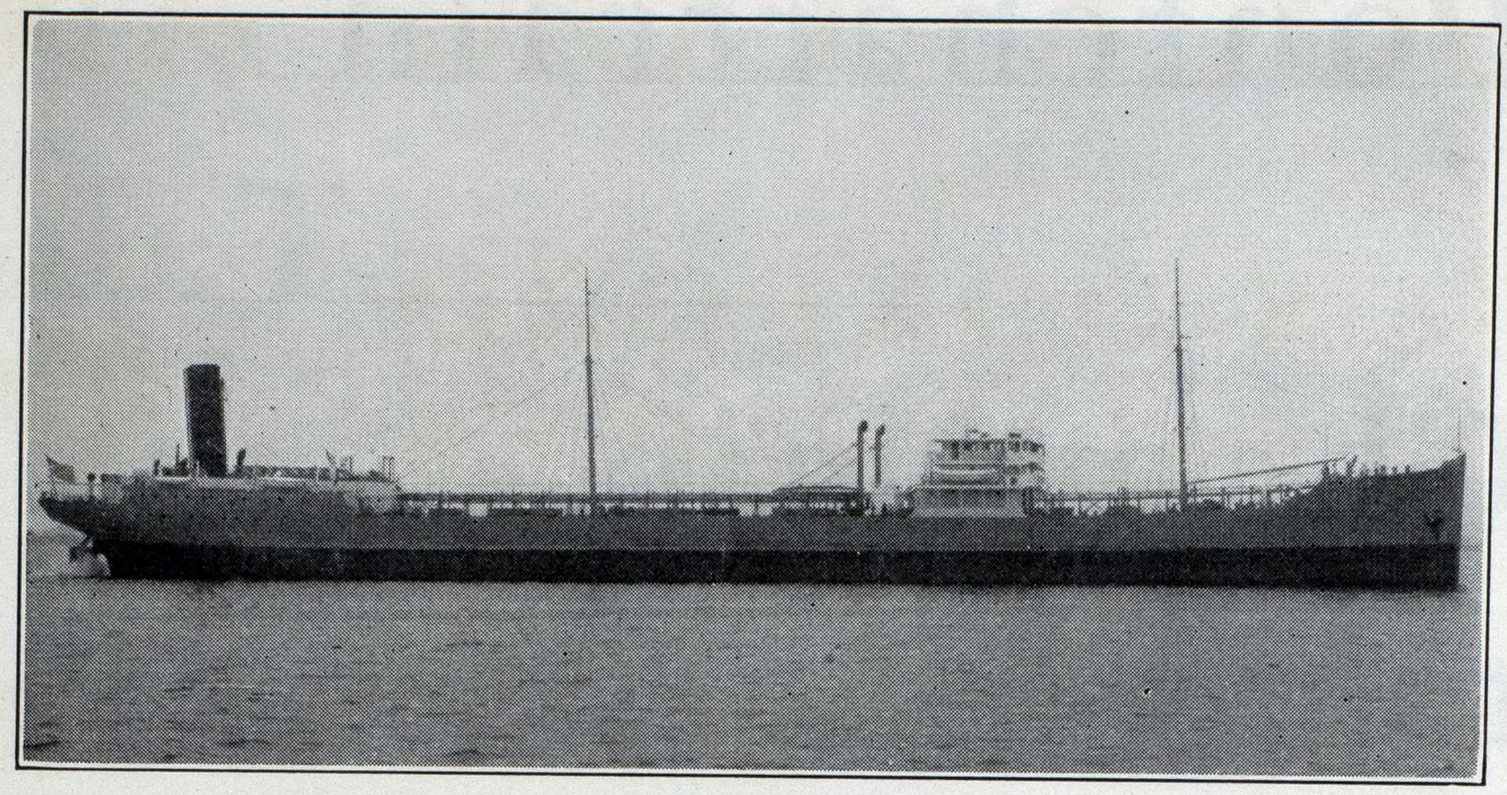
An interesting paper, entitled *"The Central Power Station Goes to Sea,"* by Commander Q. B. Newman of the coast guard was presented before the Society of Naval Architects and Marine Engineers last fall. This paper deals with the performance of the PONTCHARTRAIN.

The United States coast guard has done much to advance marine engineering by the vision and courage of its engineering personnel consisting of Commander Newman, Capt. R. B. Adams, engineer in chief, F. A. Hunnewell, superintendent of construction, under the commandant, Rear Admiral, F. C. Billard. These vessels cost $900,000 each to build.

DESCRIPTION

These vessels are a further development of the turbine electric propelling machinery with electric motor drive designed by coast guard engineers for previous cutters. The CHELAN and Class have all auxiliaries, including deck machinery, electric motor driven with the exception of the feed pump. To increase hull efficiency contra-propellers have been fitted.

SUN—Tanker—Ocean—Single Screw—Diesel



Name—SUN
Owner—Sun Oil Co. Inc.
Builder—Sun Shipbuilding & Dry Dock Co.
Naval Architect—John W. Hudson
Launched—July 14, '28; completed, July 27, '28
Classification—Lloyd's and American Bureau

HULL PARTICULARS

Length over all, 497 feet 10 inches; length between perpendiculars, 480 feet; breadth molded, 65 feet 9 inches; draft, 27 feet 2 inches; depth molded, 37 feet; displacement loaded, 18,900 tons; gross tonnage, 8943; net tonnage, 5431; cargo capacity, 4,800,000 gallons, or in cubic feet, 650,000; bunker diesel fuel capacity in tons, 611; speed, 11 knots.

MACHINERY PARTICULARS

Main Engine—One, Sun-Doxford opposed piston oil engine built by Sun Shipbuilding & Dry Dock Co. This engine is of 4-cylinder 2-cycle type with attached scavenging pump. The cylinder diameter is 600 m. m. or 23.6 inches and the combined stroke is 2320 m. m. or 91.4 inches.

Boiler—One, marine watertube type built by the Foster Wheeler Corp. Size, 4000 square feet of heating surface; fitted with Babcock & Wilcox system of oil burning.

Auxiliary Engines—Two, 4-cylinder 120-horsepower Bessemer diesel engines direct connected to 75 k. w. generators.

DESCRIPTION

This finely modeled single screw tanker is the fifteenth built by the shipyard for the same owner. Hull construction is on the Isherwood system and the vessel has the highest class in both the American and British classification societies. A single opposed piston type of diesel engine is located in the after end.

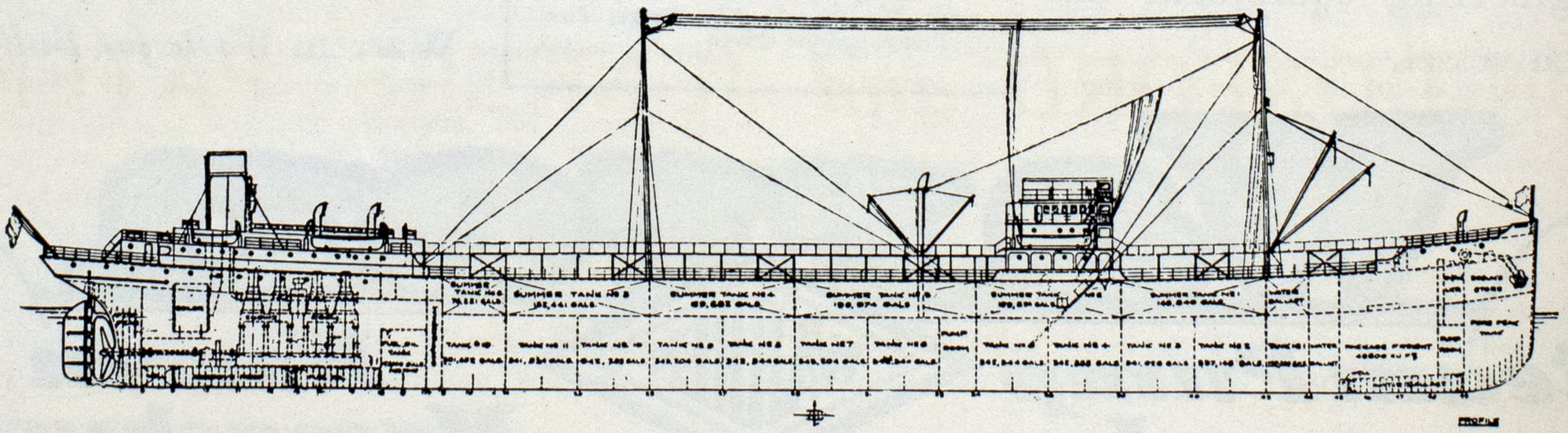
AUXILIARY EQUIPMENT

Manufacturers of:

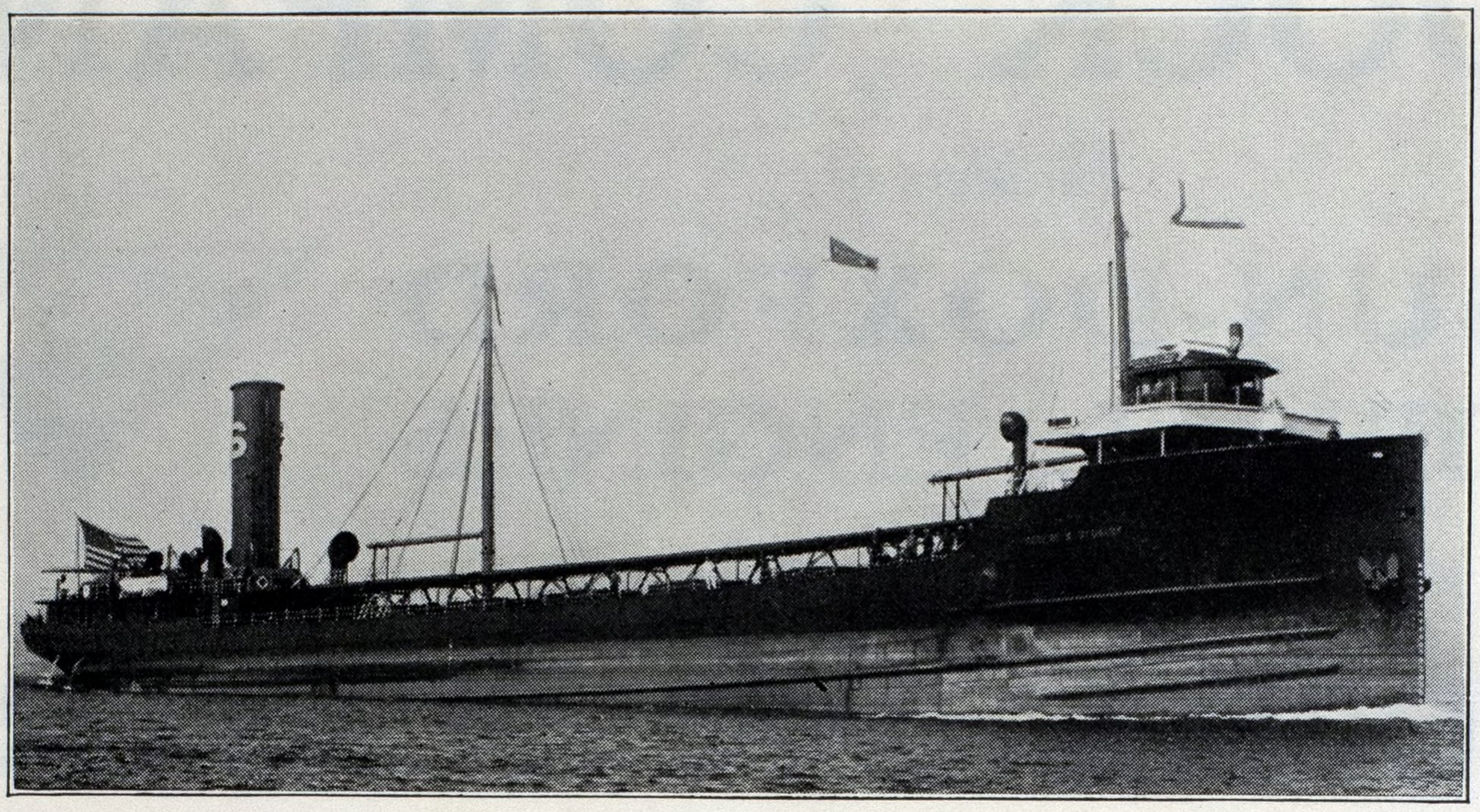
Pumps—Worthington and Kinney
Windlass—Sun Shipbuilding & D. D. Co.
Winches—Hyde Windlass Co.
Steering Gear—Sun Shipbuilding & Dry Dock Co. and American Engineering Co.
Propellers—Sun Shipbuilding & D. D. Co.
Refrigeration—Brunswick-Kroeschell Co.
Electric Generators—Two, 75 k. w. each of General Electric make.
Electric Motors—For engine room, driving auxiliary machinery, Electro Dynamic Co.
Thrust Bearing—Kingsbury Machine Works
Gyro Compass—Sperry Gyroscope Co.
Davits—Welin Davit & Boat Corp.
Radio Equipment—Radio Marine Corp.
Compass—Kelvin & Wilfrid O. White Co.

The diesel tanker SUN is a sister vessel of the SUNOIL described last year. Officer's accommodations are in the midship deck house, engineers and crew are located aft. The quarters are commodious and well ventilated. All crew's quarters are fitted with two berths only. Watches can thus be changed without disturbing seamen off duty.

Cargo pumps are of the duplex type arranged for rapid handling of liquid cargoes. The tanker SUN is now engaged in the general bulk oil carrying trade.



ROBERT W. STEWART—Tanker—Lakes—Single Screw—Steam



Name—ROBERT W. STEWART
Owner—Standard Oil Co. of Indiana
Builder—American Ship Building Co.
Naval Architect—N. J. Pluymert
Launched—Dec. 3, '27; completed, April 7, '28
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 390 feet 5 inches; length between perpendiculars, 380 feet 3 inches; breadth molded, 52 feet; depth molded, 25 feet; draft, 19 feet; displacement, 8885 tons (2240 pounds) in fresh water; gross tonnage, 4161; net tonnage, 3025; deadweight capacity in long tons at 19 feet 11 inches draft is 6000; cargo capacity, 2,071,780 United States gallons; bunker fuel oil capacity, 114,825 United States gallons; speed, 13¼ statute miles per hour.

MACHINERY PARTICULARS

Main Engine—One 3-cylinder vertical triple expansion surface condensing steam engine, built by the American Ship Building Co. Size, 23½ x 38 x 63 inches x 42-inch stroke; indicated horsepower at 90 revolutions, 2150 at 95 revolutions, 2500.

Boilers—Two, single ended, scotch marine type boilers, built by the American Ship Building Co. Size, total heating surface, 6234 square feet; 15 feet 4½ inches diameter x 11 feet 6 inches between heads; working pressure, 180 pounds per square inch; each boiler is fitted with three 46-inch diameter Morrison furnaces with Howden fronts. These boilers were built to government and American Bureau rules. Todd oil burning equipment is fitted with two 6 x 4 x 6 horizontal duplex pumps.

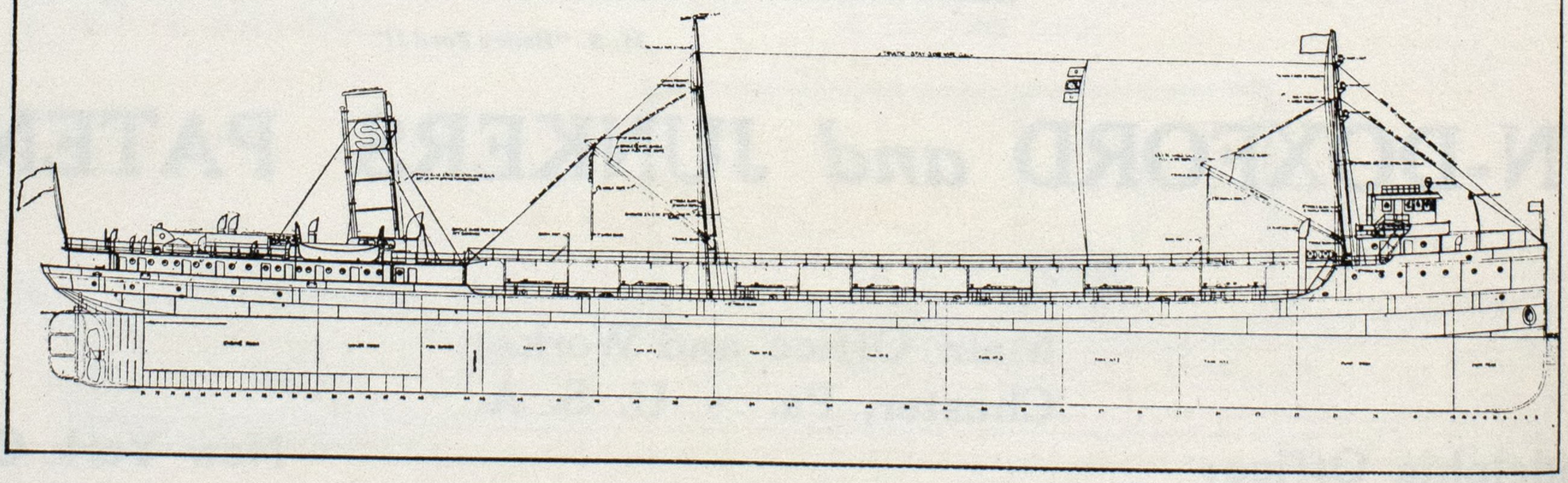
AUXILIARY EQUIPMENT

Windlass—American Ship Building Co.
Winches—American Ship Building Co.
Steering Engine—American Ship Building Co.
Propellers—American Ship Building Co.
Refrigeration—One 2-ton Brunswick-Kroeschell
Electric Generators—Two 15 k. w. Engberg
Distiller—Griscom-Russell Co.
Feed Heater—Griscom-Russell Co.
Soot Blowers—Bennett Type
Condenser—Foster-Wheeler Corp.
Anchor Chain—National Malleable Co.
Thrust Bearings—Shoe-Am. Ship Building Co.

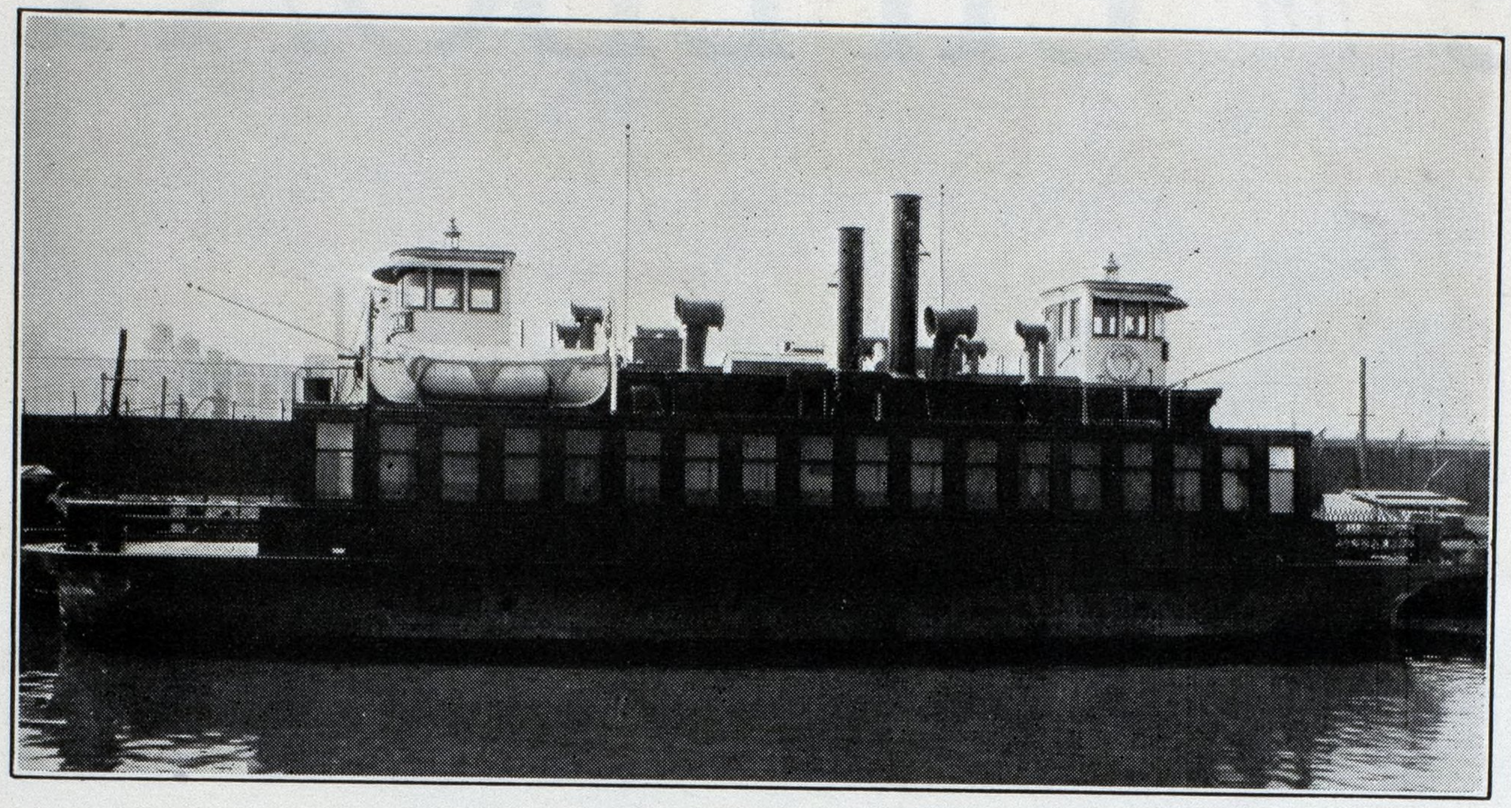
The ROBERT W. STEWART is built on the Isherwood system of longitundinal framing. The hull proper is divided into seven double main cargo tanks, each 30 feet long with a combined capacity of two million gallons. Aft of tank No. 7 are two cofferdams and a fuel bunker.

DESCRIPTION

A steel single screw steam driven oil tanker of something over two million gallons capacity for service on the Great Lakes. This vessel was built with the greatest care both in regards to hull and machinery. Workmanship and materials of the highest quality went into her building. Her design is conservative following in general the usual tanker.



MOTT HAVEN—Ferry—Double Ended—Diesel



Name—MOTT HAVEN
Owner—City of New York
Builder—Todd D. D. Eng. & Repair Corp.
Naval Architect—R. W. Morrell
Launched—July 19, '27, complete, April 30, '28
Classification—American Bureau of Shipping
Sister Ship—GREENWICH VILLAGE, by same builder; launched, July 19, '27; completed April 30, '28.

HULL PARTICULARS

Length over all, 101 feet 6 inches; length between perpendiculars, 97 feet 10½ inches; breadth molded, 26 feet 4¼ inches; depth molded 11 feet 10¼ inches; draft, 6 feet 8¾ inches; displacement, 232 tons; gross tonnage, 246; net tonnage, 167; cargo capacity, seven vehicles and 74 passengers; bunker diesel fuel oil in tons, 10; speed, 10 miles per hour.

MACHINERY PARTICULARS

Main Engine—One, 6-cylinder, 4-cycle mechanical injection, direct reversible, single acting diesel engine, built by New London Ship & Engine works of the Electric Boat Co. Size, 12½ inches cylinder diameter and 18-inch stroke; 300 brake horsepower at 250 revolutions per minute.

DESCRIPTION

A steel hull double ended ferry with a propeller at each end driven by a direct reversible diesel engine rigidly connected to the shaft forward and aft. Space is provided for a number of vehicles and there is seating capacity for 74 persons. Both this ferry and the sister boat GREENWICH VILLAGE are in service.

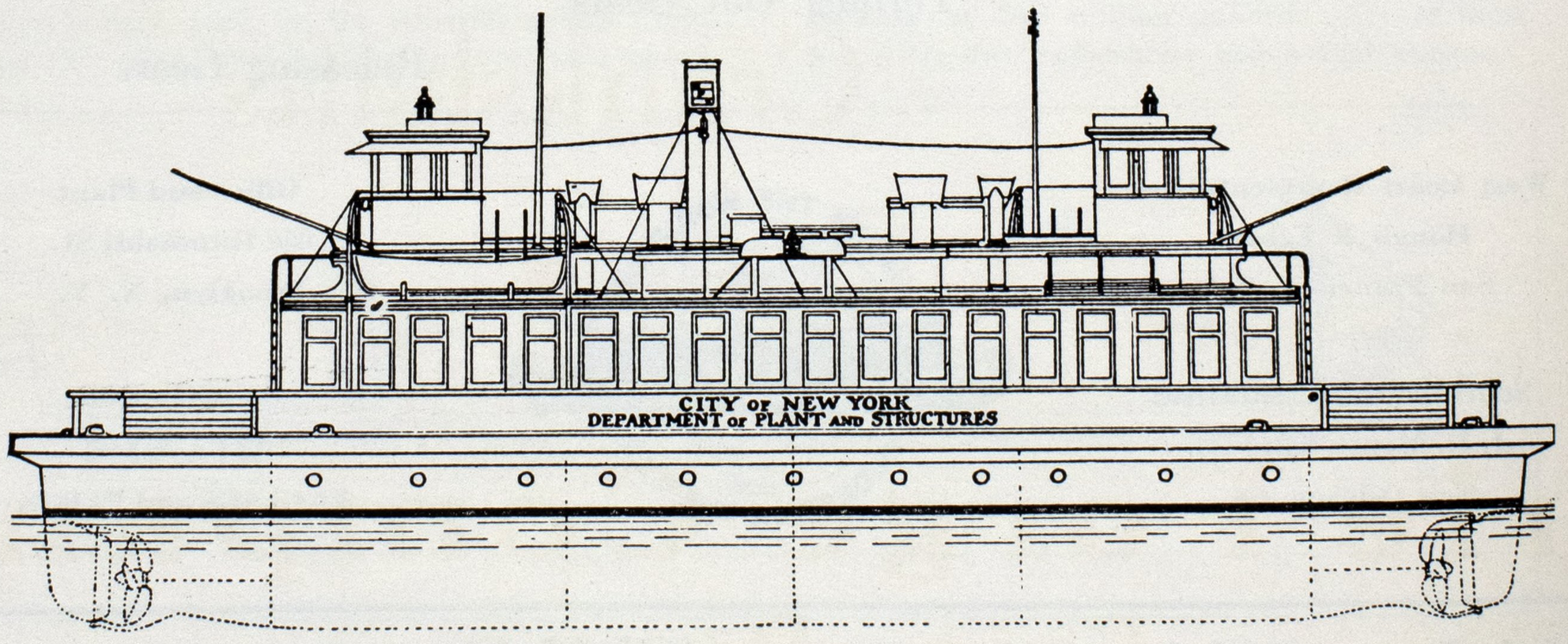
AUXILIARY EQUIPMENT

Manufacturers of:

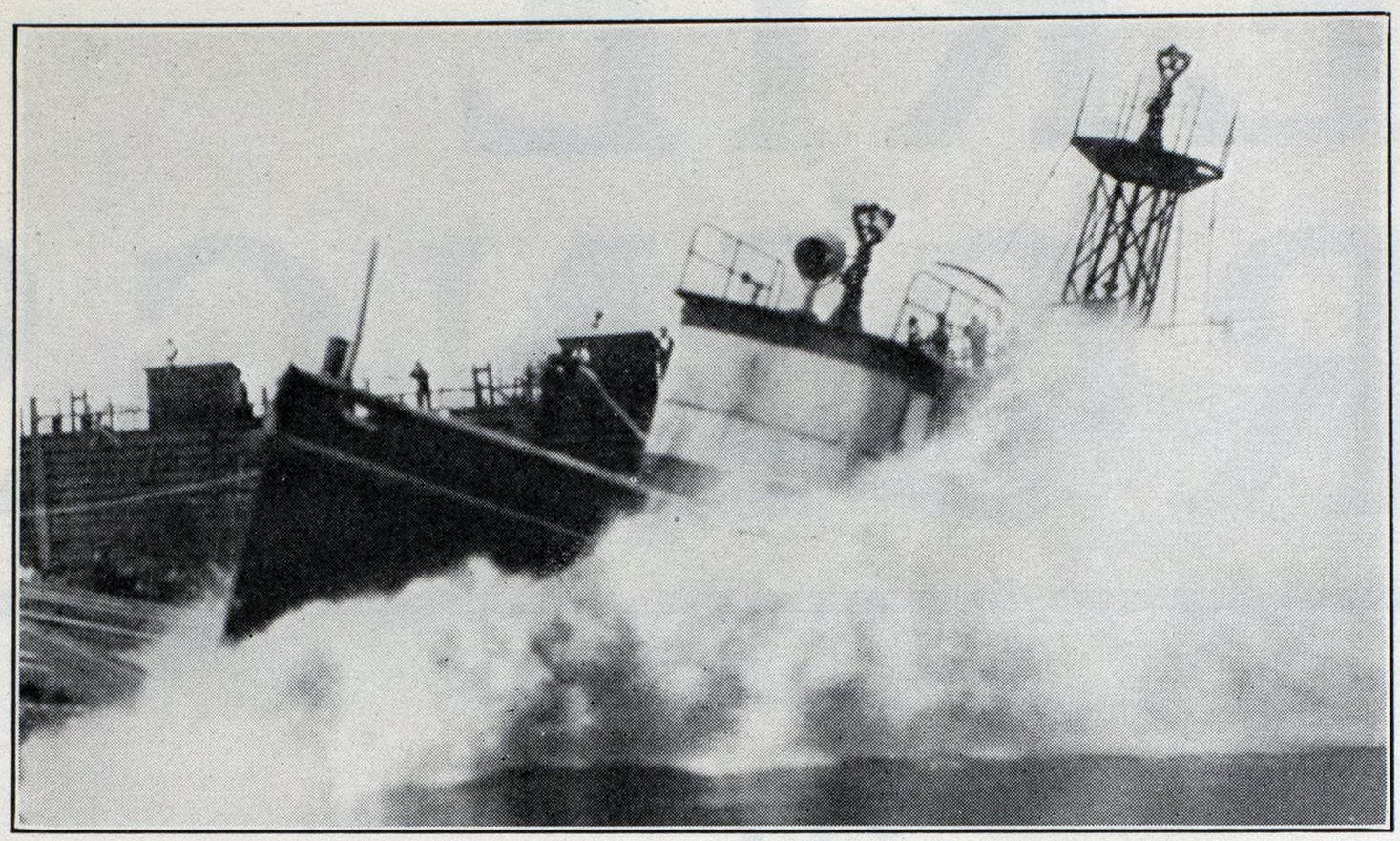
Pumps—Northern; Am. Mach. & Foundry
Steering Engine—Hand Steering—Hyde
Propellers—C. Steel, 3 blade—Ferguson
Oil Burners—Ray, on heater boiler
Air Compressors—Two—Ingersoll-Rand
Eng. Direction Indicator—McNab
Thrust Bearings—Kingsbury Machine Works
Electric Generators—Two; Electro-Dynamic Co.; Hill Diesel Engine Co.
Compressor Motors—Electro-Dynamic Co.

The MOTT HAVEN and sister vessel GREENWICH VILLAGE are the first diesel engined ferries to be constructed for the department of plant and structures of New York City. Both are steel double ended ferry boats for vehicular and passenger service to hospitals and other institutions on the islands in the East river.

There is one center driveway for vehicles with cabins on each side for passengers. No passenger accommodations on the upper deck. These ferries have replaced old steam boats and are now giving an improved service at lower cost of operation and upkeep.



CITY OF GALVESTON—Fireboat—Twin Screw—Gas Engine



Name—CITY OF GALVESTON
Owner—City of Galveston
Builder—J. S. Schofield's Sons Co.; and Gibbs Gas Engine Co. of Florida
Naval Architect—Cox & Stevens
Launch—Feb. 9, '29; completed, March 16, '29
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 87 feet 9 inches; length between perpendiculars, 85 feet; breadth molded, 18 feet; breadth over guards, 19 feet; depth molded, 9 feet 3 inches; draft mean, 6 feet; fuel capacity in gallons of gasoline, 2700; speed, 12 statute miles per hour; pumping capacity, total, 7500 gallons per minute at 150 pounds.

MACHINERY PARTICULARS

Main Engines—Two, 6-cylinder, Winton gasoline marine engines with 8-inch bore and 11-inch stroke, each developing 125 brake horsepower at 450 revolutions per minute. Each engine is direct connected to a 3-bladed solid bronze propeller.

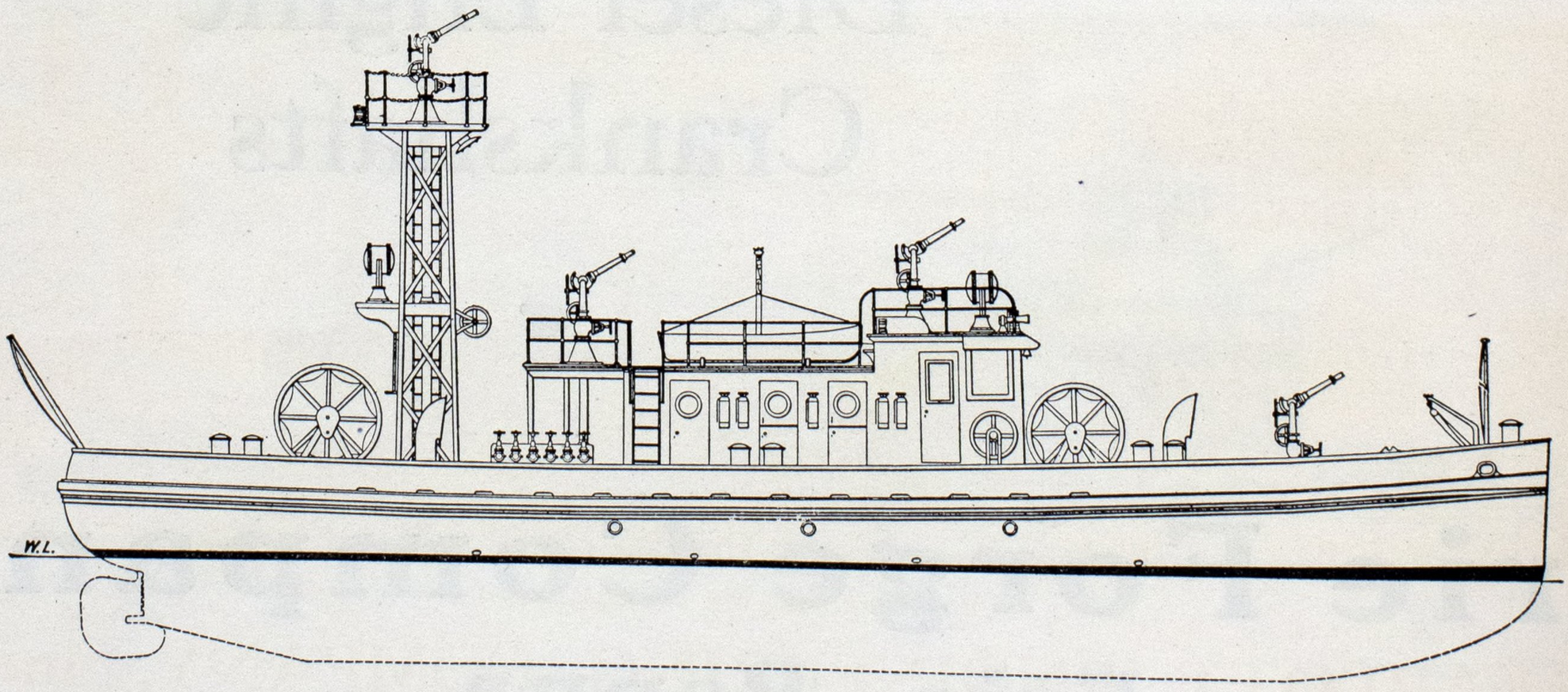
DESCRIPTION

This modern fireboat for the city of Galveston is of all steel construction including houses, excepting fenders, rail and tops of houses which are of wood. Propulsion at a speed of 12 statute miles per hour is by means of twin screws, each driven by 125 brake horsepower gasoline engines. There are two main fire pumps with a capacity of 3750 gallons per minute at 150 pounds.

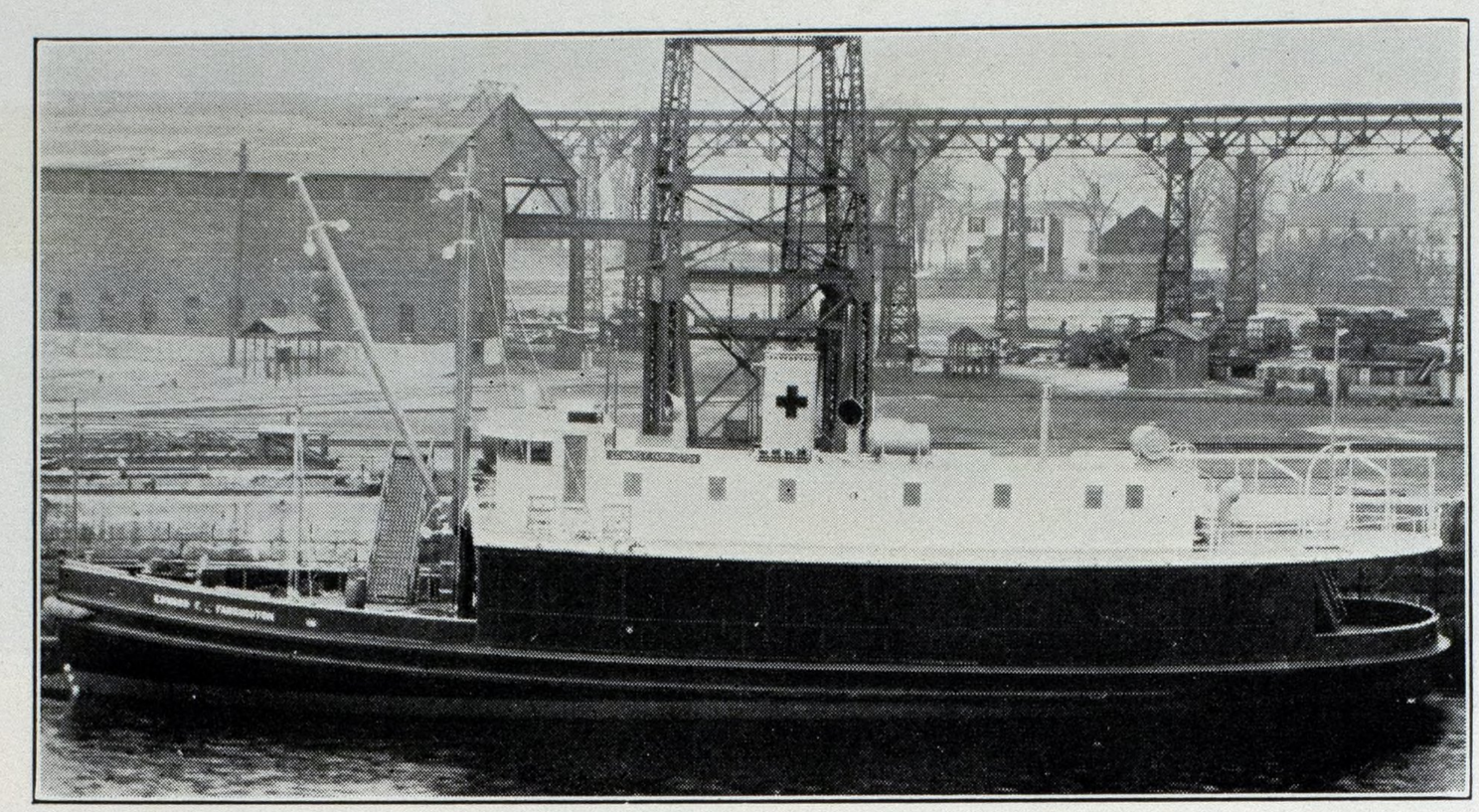
Pumping Engines—Two, 8-cylinder Winton marine gasoline engines with a bore of 8 inches and a stroke of 10 inches, developing 500 brake horsepower each at 1100 revolutions per minute. Each engine is direct connected to a two-stage centrifugal pump built by the American Well Works Co. The pump suction is 12 inches in diameter and the discharge is 10 inches in diameter. Each pump can discharge 3750 gallons per minute at 150 pounds pressure.

AUXILIARY EQUIPMENT

Pumps—American Well Works; Northern
Windlass—American Engineering Co.
Winches—American Engineering Co.
Steering Engine—American Engineering
Electric Generators—Two 10 k.w. gasoline engine driven; Winton Diesel Engine Co.
Motor Generator—One 5 k.w. Westinghouse
Engine Telegraphs—Chas. Cory & Son
Searchlights—Sperry Gyroscope Co.
Air Compressors—Two, 1 H. P. motor Winton
Fire Fighting—Ameri.-La France & Foamite



EDWARD F. FARRINGTON—Single Screw—Diesel Electric



Name—EDWARD F. FARRINGTON
Owner—Middlesex Transportation Co.
Builder—Fore River Plant, Beth. S. B. Corp.
Naval Architect—Eads Johnson
Launched—Feb. 11, '28; completed, Feb. 22, '28

HULL PARTICULARS

Length over all, 131 feet 7 inches; length between perpendiculars, 122 feet 10¾ inches; breadth molded, 30 feet; depth molded, 11 feet 3 inches; draft, 7 feet 1½ inches; displacement loaded, 323 tons; gross tonnage, 492; net tonnage, 295; cargo capacity, 142 tons; bunker diesel oil capacity, 4000 gallons; speed, 12 knots.

MACHINERY PARTICULARS

Main Engines—Two, 6-cylinder, 250 brake horsepower at 375 revolutions per minute, Winton diesel engines.

Main Generators—Two, 165 kilowatts, 250 volts, 375 revolutions per minute, shunt wound generators and two 15 kilowatts, 125 volts, 375 revolutions per minute compound wound exciters. Each generator and exciter direct connected to one of the diesel engines described above. Generators and exciters furnished by the General Electric Co.

DESCRIPTION

A diesel electric freighter for service in bays, harbors and canals, of all steel construction. Electric drive is suitable in this case particularly because of maneuvering in restricted waters. There is a single continuous main deck. The cargo space is located between this deck and the upper deck which extends from the stern.

Main Drive Electric Motor—One double armature D.C. motor of 400 horsepower at 250 volts and 160 revolutions per minute; shunt wound. Furnished by General Electric Co.

Auxiliary Oil Engine—One Hill diesel, 2-cylinder, 4-cycle 12 horsepower at 550 revolutions driving an Electro-Dynamic Co. generator.

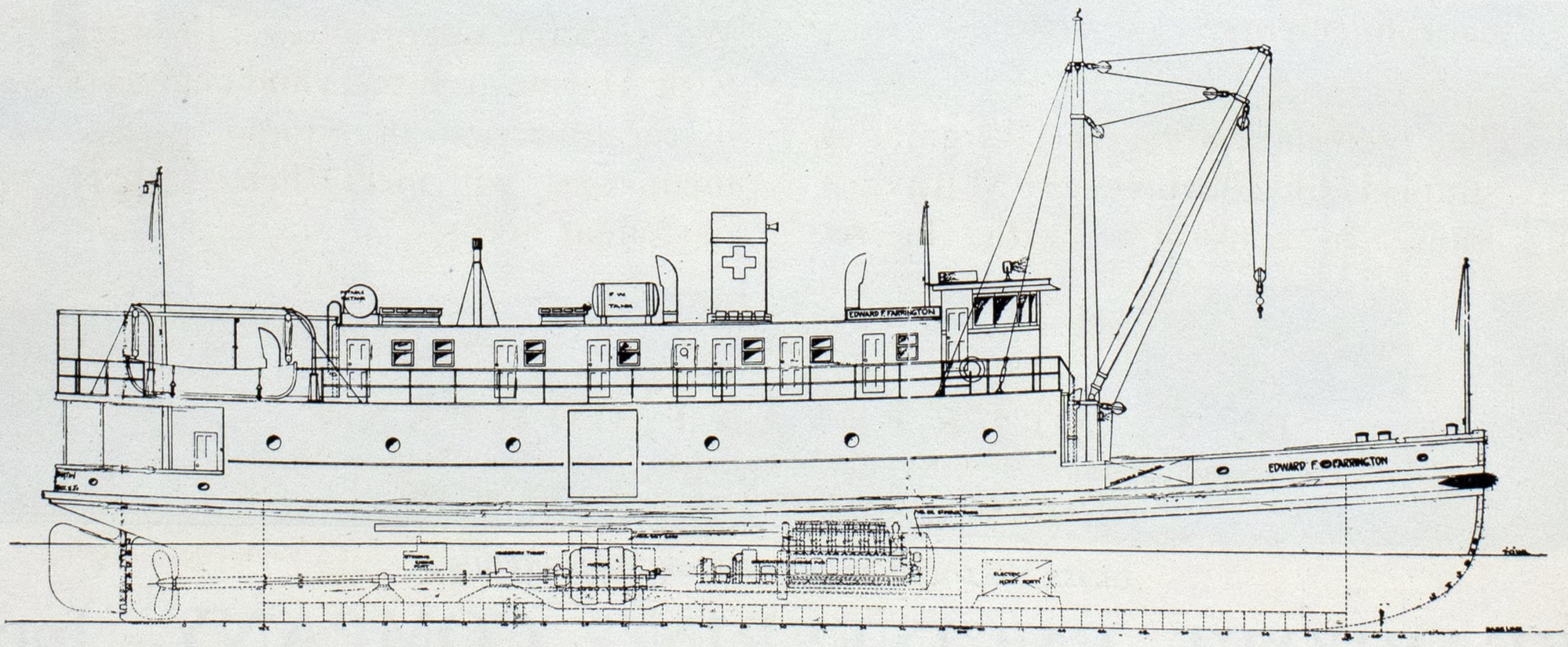
Boiler—One watertube boiler burning oil, for heating purposes, American Radiator Co.

AUXILIARY EQUIPMENT

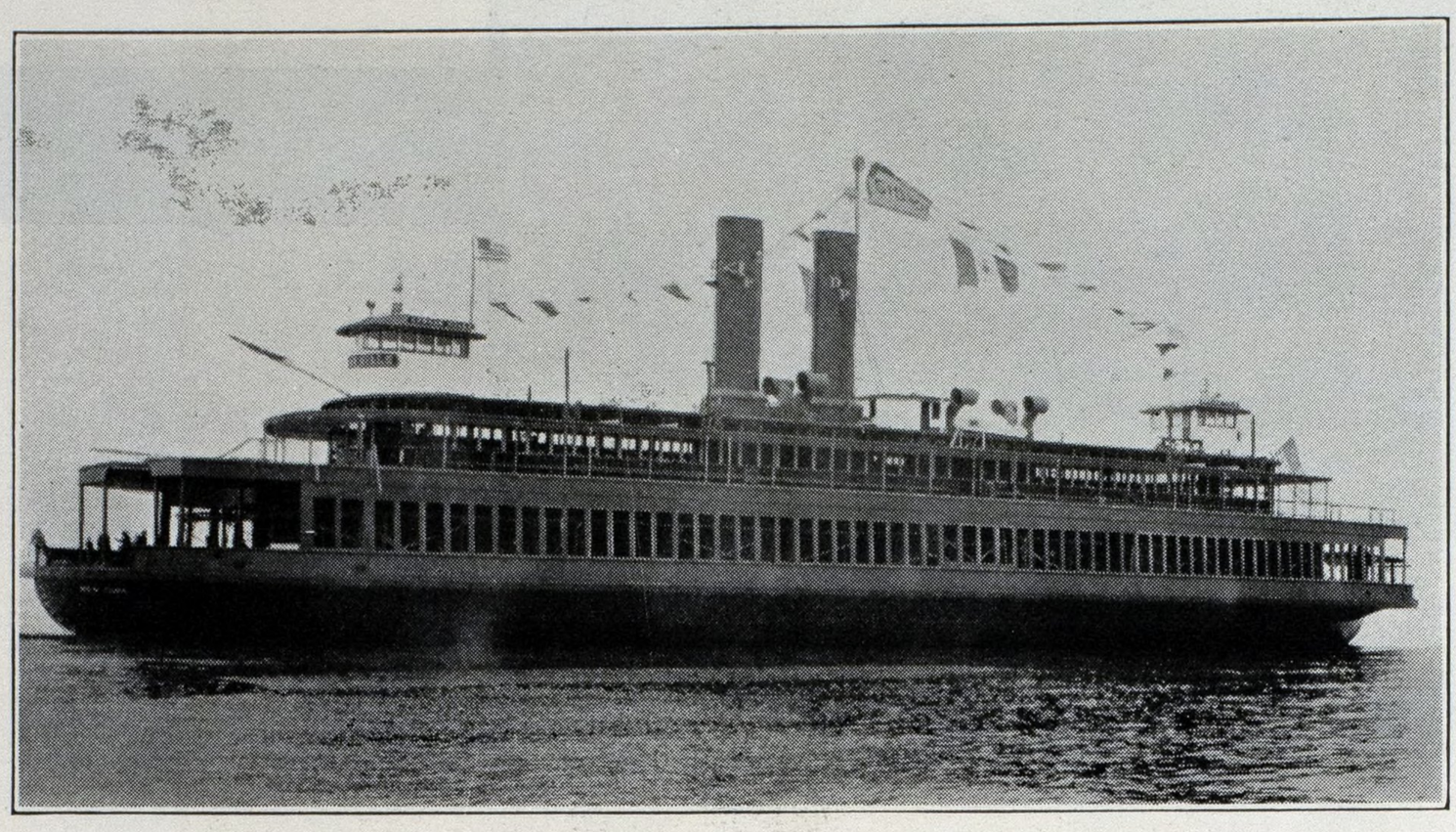
Manufacturers of:

Pumps—Northern; and Rumsey
Winches—Lidgerwood Mfg. Co.
Steering Engine—American Engineering Co.
Propellers—Fore River Plant, Beth. S. B. Corp.
Electric Controls—Cutler-Hammer
Rolling Doors—Kinnear
Electric Generators—General Electric; Electro-Dynamic
Thrust Bearing—Kingsbury Machine Works
Recording Instruments—Leeds & Northrup

This is a unique diesel electric freight boat adapted particularly for the needs of the owner, Johnson & Johnson, manufacturer of surgical accessories at Brunswick, N. J.



DONGAN HILLS—Ferry—Double Ended—Screw-Steamer



Name—DONGAN HILLS
Owner—City of New York
Builder—Staten Island Plant, United D. D. Inc.
Naval Architect—R. W. Morrell
Launched—March 19, 1929
Classification—American Bureau of Shipping

HULL PARTICULARS

Length over all, 267 feet; length between perpendiculars, 254 feet; breadth molded, 66 feet; depth molded, 19 feet 9 inches; draft loaded 13 feet 9 inches; displacement light, 1785 tons; gross tonnage, about 2200; net tonnage, about 1550; passenger capacity 2300; automobile capacity, 32; bunker fuel oil capacity in gallons, 32,000; speed, 12 knots.

MACHINERY PARTICULARS

Main Engines—One double compound condensing 22½ x 50 inches diameter of cylinders and 30-inch stroke; about 4000 indicated horsepower; built by Staten Island plant, United D. D., Inc.

Boilers—Four, built by Babcock & Wilcox Co.; marine watertube type, each of about 3577 square feet of heating surface; working pressure, 225 pounds per square inch; fuel, oil; forced draft by means of turbine-driven blowers; oil burners are fitted with a variable control system to regulate the steaming while in the slip.

DESCRIPTION

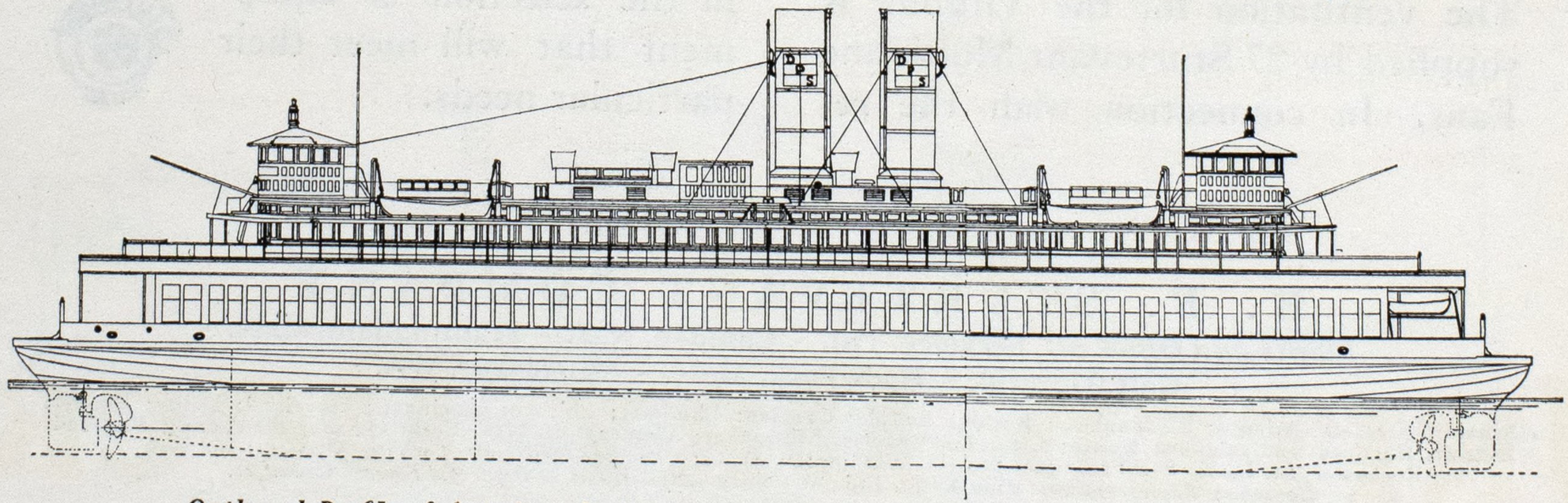
A double decked double ended ferryboat with two team gangways and two passenger cabins, one on each side of the main deck. Recently launched this vessel is the latest ferryboat for the city of New York and it is also the largest, exceeding the AMERICAN LEGION in length by three feet. She will operate between New York and St. George.

AUXILIARY EQUIPMENT

Pumps—Worthington, and Dean Bros. Co.
Steering Engine—Hyde Windlass Co.
Propellers—United D. D., Inc. S. I. Plant
Oil Burning—Todd D. D., Eng. & Repair Corp.
Generators—General Electric Co.
Heaters, Feed Water—Davis Eng. Corp.
Blowers—B. F. Sturtevant Co.
Fire Protection—Amer. LaFrance & Foamite

The DONGAN HILLS latest ferryboat for the city of New York, also the largest, is a double ended, steel hull, screw propelled oil burning vessel. She is similar in general features to the AMERICAN LEGION. She has two decks with passenger accommodations on both upper and lower decks affording seating capacity for 1650 persons. On the main deck there are two gangways providing accommodations for approximately 32 vehicles. This ferry will operate between South Ferry, Manhattan and St. George, Staten Island a distance of about five miles.

Metal sheathing provides maximum protection from fire. Lifeboats, life belts and life rafts are provided to meet the maximum requirements of the United States steamboat inspection service. Improved cabin lighting arrangements provide better diffusion of light than in previous boats of the same type.

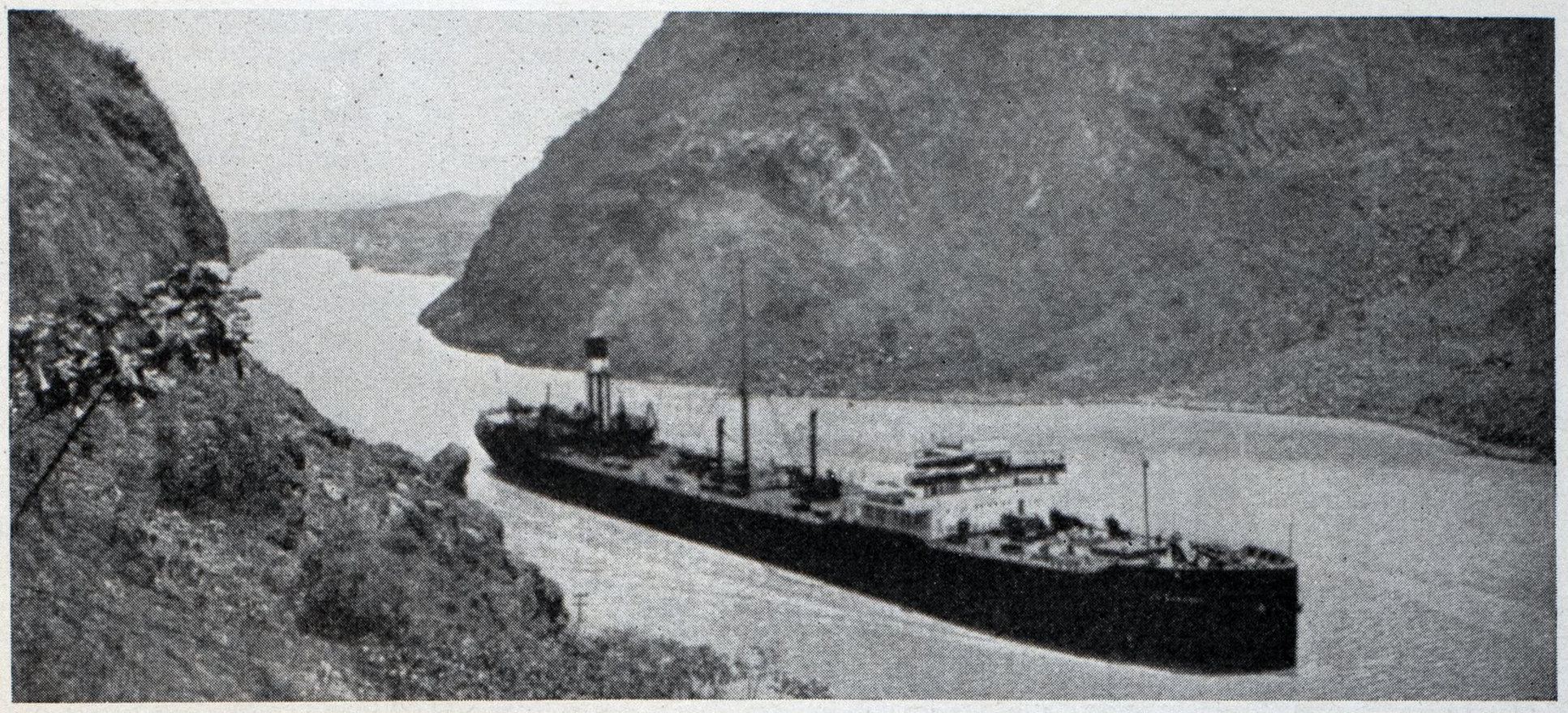


Outboard Profile of American Legion, similar to the Dongan Hills except three feet shorter

Merchant Steel Vessels Over 100 Tons Under Construction in American Shipyards During 1928

Vessel	Yard	Type	Class	Gross	Owners	Mach.	H.P.	Len. ft. in.	Beam ft. in.	Dep. ft. in.	Fuel	Remarks	Status
Alki	Pacific Coast Eng. Co.	Fire Bt.	Harbor	197	City of Seattle	Gas Eng.	300	123 6	26	11 6	Gas	Waterfront Protection	Completed
Berwindglen	Fore River, Beth. S. B. Co.	Collier	Coast	4500	Wilmore S. S. Co.	Recip.	2000	366 6	50	30 3	Coal	Coastwise Coal Carrier	Under con.
Berwindvale	Fore River, Beth. S. B. Co.	Collier	Coast	4500	Wilmore S. S. Co.	Turb.	2000	366 6	50	30 3	Coal	Coastwise Coal Carrier	Under con.
Boston College	Bath Iron Works	Fishing	Coast	241	A and P Fish Co.	Oil Eng.	400	124	23	13 6	Oil	Offshore Fishing	Completed
Cadillac	Great Lakes Eng. Works	Ferry	Lakes	636	Detroit-Windsor Fer. Co.	Recip.	1200	170 6	56	17 11	Coal	Ferry, Detroit-Windsor	Completed
California	Newport News S. B. Co.	Pass.	Ocean	20325	American Line S. S. Corp.	Turb. Elec.	13500	601 3	80	52	Oil	N. Y. - Panama - Pacific	Completed
Catharine Davis	Howard Ship Yd. & Dk. Co.	T. Boat	Rivers	334	Island Creek Coal Co.	Recip.	276	156 9	26 6	5	Coal	River Towing	Completed
C. C. Slider	Midland Barge Co.	T. Boat	Rivers	371	E. T. Slider	Recip.	578	168 6	32	5 6	Coal	River Towing—Stern W.	Completed
Chagres	Panama Canal	T. Boat	Ocean	...	Panama Canal	Oil Elec.	750	126 5	28	15 7	Oil	Canal Zone Waters	Completed
Champlain	Fore River, Beth. S. B. Co.	Cutter	Ocean	...	U. S. Government	Turb. Elec.	3000	250	42	26 10	Oil	U. S. Coast Guard	Under con.
Chas. F. Humphrey	Spear Engineers Inc.	Ferry	Bays	300	War Department	Oil Eng.	400	128	44	14 6	Oil	Governors Island-N. Y.	Completed
Chelan	Fore River, Beth. S. B. Co.	Cutter	Ocean	...	U. S. Government	Turb. Elec.	3000	250	42	26 10	Oil	U. S. Coast Guard	Completed
City of Galveston	J. S. Schofield's Sons Co.	Fire Bt.	Harbor	...	City of Galveston	Gas	250	89	18 6	9 3	Gas	Fire Fighting	Under con.
Cormorant	New London S. & E. Co.	Fishing	Coast	371	Ocean Trawling Co.	Oil Eng.	500	150	25 1	14 6	Oil	Offshore Fishing	Completed
Coronado	Moore Drydock Co.	Ferry	Bays	499	San Diego & Cor. Ferry	Oil Elec.	750	190 1	60 1	14 9	Oil	Pass. and Auto Ferry	Under con.
Crucible		T. Boat	River	283	Crucible Fuel Co.	Recip.	..	..	..	..	Coal	River Towing	Completed
Delta Standard	Union Plant, Beth. S. B. Co.	Tanker	Bays	111	Standard Oil of Calif.	Gas	300	101 4	22	5 9	Gas	Shallow Bay Service	Under con.
Dixie	Federal S. B. & D. D. Co.	Pass.	Ocean	8188	Southern Pac. S. S. Lines	Turb.	7100	445	60	37	Oil	Pass. and Freight Coastwise	Completed
Dongan Hills	Staten Island S. B. Co.	Ferry	Harbor	2000	City of New York	Recip.	4000	267	66	19 9	Oil	Municipal Ferry Service	Under con.
Douglas Alexander	W. A. Fletcher Co.	Lighter	Harbor	...	Singer Mfg. Co.	Oil Eng.	500	100	30 7	10 4	Oil	Carries Export Freight	Completed
Dwight F. Davis	Charles Ward Eng. Wks.	T. Boat	Rivers	400	Inland Waterways Corp.	Recip.	..	140	25	9	Coal	River Towing	Under con.
Edward F. Farrington	Fore River, Beth. S. B. Co.	Cargo	Coast	492	Middlesex Transp. Co.	Oil Elec.	400	131 7	30	11 3	Oil	Coastal Service	Completed
Funza	Marietta Mfg. Co.	T. Boat	Rivers	560	Columbian S. S. Co.	Recip.	500	192	42	5	Oil	River Towing Stern W.	Completed
General Humphreys	Chas. Ward Eng. Wks.	Inspec.	Rivers	103	U. S. Engineers	Oil Eng.	250	85	18	7	Oil	For River Inspection	Completed
Georgetown	Bath Iron Works	Fishing	Coast	229	A and P Fish Co.	Oil Eng.	400	124	23	13 6	Oil	Offshore Fishing	Under con.
Greenwich Village	Todd Eng. D. D. & Rep. Co.	Ferry	Harbor	246	City of New York	Oil Eng.	300	101 6	26 4½	11 10¼	Oil	East River Ferry Service	Completed
Harold J. Taggart	Mathis Shipbuilding Co.	T. Boat	Harbors	110	Reading Railroad	Oil Eng.	400	83	20	10	Oil	Harbor — Shifting Floats	Completed
Holy Cross	Bath Iron Works	Fishing	Coast	229	A and P Fish Co.	Oil Eng.	400	124	23	13 6	Oil	Offshore Fishing	Completed
Hualalai	Union Plant, Beth. S. B. Co.	Pass.	Coast	3100	Inter-Island St. Nav. Co.	Turbine	4000	310 10	48	27 6	Oil	Hawaiian Islands	Under con.
Hull No. 8	Electric Boat Co.	T. Boat	Harbor	140	Electric Boat Co.	Oil Eng.	500	88 9	21 6	11 3	Oil	Harbor and Bay Towing	Under con.
Hull No. 70	Charles Ward Eng. Wks.	T. Boat	Rivers	267	International Cement Corp.	Recip.	..	..	..	..	Oil	River Towing	Completed
Hull No. 116	Sun S. B. & D. D. Co.	Pass.	Ocean	8500	Amer. So. Africa. Line	Oil Eng.	5000	470 8	61 6	37	Oil	N. Y. So. African Service	Under con.
Hull No. 117	Sun S. B. & D. D. Co.	Tanker	Coast	2000	Sun Oil Co.	Oil Eng.	1000	255	43	18 6	Oil	Oil Tanker Coastwise	Under con.
Hull No. 175	Moore Drydock Co.	Dredge	Harbors	468	San Francisco Commission	Oil Eng.	..	..	..	..	Oil	Harbor Dredging	Completed
Hull No. 176	Moore Drydock Co.	Ferry	Bays	1200	Western Pacific R. R. Co.	Oil Elec.	..	..	..	..	Oil	Trans. Bay Ferry Service	Under con.
Hull No. 177	Moore Drydock Co.	Ferry	Bays	1200	Atlan. & S. Fe. R. R. Co.	Oil Elec.	..	..	..	..	Oil	Transbay Ferry Service	Under con.
Hull No. 265	Spedden S. B. Co.	Patrol	Harbor	300	New York City	Recip.	..	121 5½	24	13 3	Oil	Harbor Patrol Boat	Under con.
Hull No. 614	Dravo Contracting Co.	T. Boat	Rivers	268	Built for Stock	Recip.	..	..	..	..	Coal	River Towing	Completed
Hull No. 1039	Pusey & Jones Corp.	Tanker	Coast	2000	Tidewater Oil Co.	Oil Elec.	1000	266 6	44	18 6	Oil	Oil Tanker Coastwise	Under con.
Hull No. 1642	Howard Shipyards Co.	T. Boat	Rivers	110	T. L. Herbert & Sons	Recip.	..	..	..	..	Coal	River Towing	Completed
Humuula	Union Plant, Beth. S. B. Co.	Pass.	Coast	950	Inter-Island St. Nav. Co.	Turbine	1850	220	38	17	Oil	Hawaiian Islands	Under con.
Hydraulic Dredge No. 4	Syracuse Shops	Dredge	Canal	...	State of New York	Oil Eng.	625	106	28	8	Oil	Canal Dredging	Completed
Hydrographer	Spear Engineers Inc.	Survey	Coast	470	C. & Geodetic Survey	Oil Elec.	650	167 5	31 6	19 6	Oil	Atlantic Coast Survey	Under con.
Incor	Charles Ward Eng. Wks.	T. Boat	Rivers	221	.....	Oil Eng.	720	..	..	..	Oil	River Towing	Completed
James Fucik	Manitowoc S. B. Corp.	T. Boat	Lakes	95	.....	Recip.	700	..	..	..	Coal	Lakes Towing	Completed
John F. Cushing	Manitowoc S. B. Corp.	T. Boat	Lakes	301	Gt. Lakes Dredge & D. Co.	Oil Eng.	1000	125	27	16 2	Oil	Lakes Towing	Completed
John M. Dennis	Spear Engineers Inc.	Ferry	Bays	640	Claiborne-Annap. Fer. Co.	Oil Eng.	1680	220	60	14 6	Oil	Claiborne-Annap. Md.	Under con.

Las Cruces	Ellicott Machine Corp.	Dredge	Harbors	...	Panama Canal	Oil Elec.	3600	226	50	14	Oil	Canal Zone Operation	Completed
Lightship	Albina Marine & Iron Wks.	L. Ship	Coast	...	U. S. Bureau of Lighthouses	Oil Elec.	400	133 3	30	15	Oil	Off Shore Lightship	Under con.
Lightship No. 100	Charleston D. D. & M. Co.	L. Ship	Coast	630	U. S. Bureau of Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Off Shore Lightship	Under con.
Lightship No. 113	Charleston D. D. & M. Co.	L. Ship	Coast	630	U. S. Bureau of Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Off Shore Lightship	Under con.
Lightship No. 114	Charleston D. D. & M. Co.	L. Ship	Coast	630	U. S. Bureau of Lighthouses	Oil Elec.	350	133 3	30	15	Oil	Off Shore Lightship	Under con.
L. R. R. No. 1	Pusey & Jones Corp.	Tug	Harbor	186	Pennsylvania Railroad	Oil Elec.	..	105	24	14	Oil	Harbor Shifting Tug	Completed
Martha E. Allen	American S. B. Co.	Tanker	Lakes	2935	Lakes Tanker Corp.	Oil Eng.	1500	344	51	18 6	Oil	Tanker—Great Lakes	Completed
Mary Ellen O'Neil	Sun S. B. & D. D. Co.	Tanker	Ocean	11628	California Pet. Corp.	Oil Eng.	4200	510	70	40	Oil	Bulk Oil Carrier—Ocean	Completed
Material Service	L. D. Smith Dock Co.	Unloader	Lakes	1200	L. D. Smith et al.	Oil Eng.	700	246	40	15	Oil	Lakes—River Service	Under con.
Mendota	Fore River, Beth. S. B. Co.	Cutter	Ocean	...	U. S. Government	Turb. Elec.	3000	250	42	26 10	Oil	U. S. Coast Guard	Under con.
M. J. Derby	Federal S. B. & D. D. Co.	Tanker	Harbor	356	Ira S. Bushey & Sons	Oil Eng.	360	..	..	..	Oil	Harbor and Bay Service	Completed
Mott Haven	Todd Eng. D. D. & Rep. Co.	Ferry	Harbor	246	City of New York	Oil Eng.	300	101 6	26	4½ 11	10¼ Oil	East River Ferry Service	Completed
Naushon	Fore River, Beth. S. B. Co.	Pass.	Sound	1200	New England S. S. Co.	Recip.	1200	210 1	36	14 3	Coal	New Bedford-Nantucket	Under con.
New Bedford	Fore River, Beth. S. B. Co.	Pass.	Sound	1117	New England S. S. Co.	Recip.	1200	210 1	36	14 3	Coal	New Bedford-Nantucket	Completed
Orient	Los Angeles S.B. & D.D. Co.	Fishing	Coast	217	J. Souza & F. V. Thedore	Oil Eng.	350	112 6	25	12	Oil	Tuna Fishing	Completed
Pennsylvania	Newport News S. B. Co.	Pass.	Ocean	20770	American Line S. S. Corp.	Turb. Elec.	17000	613 3	80	52	Oil	N. Y. - Panama - Pacific	Under con.
Pere Marquette 23	Manitowoc S. B. Corp.	Ferry	Lakes	3600	Pere Marquette Railway	Turb. Elec.	7200	381	57	22 6	Coal	Carferry-Lake Michigan	Under con.
Pere Marquette 24	Manitowoc S. B. Corp.	Ferry	Lakes	3600	Pere Marquette Railway	Turb. Elec.	7200	381	57	22 6	Coal	Carferry - Lake Michigan	Under con.
Pontchartrain	Fore River, Beth. S. B. Co.	Cutter	Ocean	...	U. S. Government	Turb. Elec.	3000	250	42	26 10	Oil	U. S. Coast Guard	Completed
President Warfield	Pusey & Jones Corp.	Pass.	Bays	1814	Baltimore Steam Packet Co.	Recip.	2600	330	56 6	18 6	Coal	Baltimore-Norfolk Run	Completed
P. R. R. No. 17	Pusey & Jones Corp.	Tug	Harbor	186	Pennsylvania Railroad	Oil Elec.	..	105	24	14	Oil	Harbor Shifting Tug	Completed
P. R. R. No. 152	New York S. B. Co.	Lighter	Harbor	299	Pennsylvania Railroad	Recip.	400	110 3	32	15	Coal	Harbor Lighterage Service	Completed
Robert W. Stewart	American S. B. Co.	Tanker	Lakes	4161	Standard Oil Co. (Indiana)	Recip.	2200	390 5	52	25	Oil	Tanker - Great Lakes	Completed
San Craigo	Midland Barge Co.	T. Boat	Rivers	294	Union Barge Line Corp.	Recip.	750	177	34	6 6	Coal	River Towing	Completed
Santa Clara	New York S. B. Co.	Pass.	Ocean	9000	Grace Line Inc.	Turb. Elec.	12000	502	64	37 5	Oil	N. Y. - West Coast S. A.	Under con.
Sea Hawk	City Island	Fishing	Coast	386	John G. Kinney	Recip.	500	..	..	..	Oil	Offshore Fishing	Completed
Shawmut	Fore River, Beth. S. B. Co.	Fishing	Coast	235	Mass. Trawling Co.	Oil Eng.	380	122 4	23	12 6	Oil	Offshore Fishing	Completed
Sun	Sun S. B. & D. D. Co.	Tanker	Ocean	9074	Sun Oil Co.	Oil Eng.	2800	497 10	65 9	37	Oil	Bulk Oil Carrier — Ocean	Completed
Tahoe	Fore River, Beth. S. B. Co.	Cutter	Ocean	...	U. S. Government	Turb. Elec.	3000	250	42	26 10	Oil	U. S. Coast Guard	Completed
Tecumseh	Chas. Ward Eng. Wks.	T. Boat	Rivers	155	U. S. Engineers	Oil Elec.	300	110	23	5	Oil	River Towing - Stern Wheel	Completed
The Straits of Mackinac	Great Lakes Eng. Works	Ferry	Lakes	723	State of Michigan	Recip.	1000	203	48	16 6	Coal	Straits of Mackinac	Completed
Trimount	Fore River, Beth. S. B. Co.	Fishing	Coast	235	Mass. Trawling Co.	Oil Eng.	380	122 4	23	12 6	Oil	Offshore Fishing	Completed
Trinidad	Panama Canal	T. Boat	Harbors	...	Panama Canal	Oil Elec.	750	126 5	28	15 7	Oil	Canal Zone Waters	Completed
Unknown		Snag Bt.	Rivers	...	United States Engineers	Recip.	..	146 6	30	4 4	Coal	River Snag Boat	.....
Unknown	Electric Boat Co.	Ferry	Harbor	400	State of New York	Oil Elec.	500	115 6	38	14	Oil	Pass. and Auto Ferry	Under con.
Unknown	Electric Boat Co.	Ferry	Harbors	400	State of New York	Oil Elec.	500	115 6	38	14	Oil	Pass. and Auto Ferry	Under con.
Unknown	Spear Engineers Inc.	Ferry	Harbors	380	Norfolk Co. Ferries Co.	Oil Elec.	650	173	57 6	14	Oil	Norfolk - Portsmouth Ferry	Under con.
Virginia	Newport News S. B. Co.	Pass.	Ocean	20773	American Line S. S. Corp.	Turb. Elec.	17000	613 3	80	52	Oil	N. Y. - Panama - Pacific	Completed
Virginia Lee	Fore River, Beth. S. B. Co.	Pass.	Bay	2158	Pennsylvania Railroad	Recip.	2900	302 6	42 5	17	Coal	Cape Charles - Norfolk	Completed
Waialeale	Union Plant, Beth. S. B. Co.	Pass.	Coast	2900	Inter-Island St. Nav. Co.	Turbine	4000	310 10	48	27 6	Oil	Hawaiian Islands	Completed
Warrior	Amer. Bridge Co.-Carnegie	T. Boat	Rivers	400	Tenn. Coal, Iron & R. R. Co.	Oil Elec.	1100	140 8	25	9 3	Oil	River Towing Screw	Under con.
William J. O'Brien	Fore River, Beth. S. B. Co.	Fishing	Coast	215	R. O'Brien & Co.	Oil Eng.	380	122 4	23	12 6	Oil	Off Shore Fishing	Completed
W. J. Harahan	Newport News S. B. Co.	T. Boat	Harbors	266	Chesapeake & Ohio R. R.	Recip.	800	109	28	14 6	Coal	Harbor-Shifting Floats	Completed
Yorktown	Newport News. S. B. Co.	Pass.	Bay	1547	Chesapeake S. S. Co.	Recip.	2700	277 3	46	18	Coal	Baltimore Norfolk Run	Completed
Yorkville	Todd D. D. & Rep. Co.	Ferry	Harbor	593	City of New York	Recip.	850	151	53	14 3	Oil	Passenger Ferry East River	Under con.



Large Freighter Passing Through Gaillard Cut, Near Gold Hill, Panama Canal

Reduce Panama Canal Toll Rates

Revenue Now Exceeds Self-Supporting Basis—Tolls Revision Needed—Dual Measurement Troublesome—Technicalities Cause Unfair Differences in Charges

By E. C. Powers

A SHIP, outbound from Yokohama, traveling by way of the Panama canal, covers a distance of 9699 miles to reach New York. Another vessel of the same speed sailing westward via the longer Mediterranean route, a distance of 13,056 miles, would be at a point 3357 miles from New York at the time the first ship arrived there. This illustrates the great saving in time which the Panama canal has made possible for shipping throughout the world. It is no wonder therefore that transits through the Panama canal, since its opening, have grown to tremendous proportions and that the total for the calendar year 1928, is greater than for any previous year.

In the annual report of the governor of the Panama canal for the fiscal year 1928 the following statement appears:

"The canal opened to traffic on Aug. 15, 1914, was blocked by slides at various times during the first few years and with the relatively light traffic of the first nine years, did not return a revenue commensurate with its cost. Beginning with the fiscal year 1923, there was a distinct advance. The following year showed a further increase to be followed in 1925 with a decrease. Since 1925 the net revenue for each year has been higher than for the year preceding."

During the 15 years of operation the tonnage passing annually through the Panama canal has increased from the 1,758,625 tons of cargo in 1914 when 350 vessels transited the canal paying $1,508,737.56 in tolls, to 29,401,581 tons of cargo in 1928, during which year 6334 ships passed through the canal paying tolls aggregating $26,375,962.41. The average tolls paid per day has increased during the 15-year period from approximately $4133.52 in 1914 to about $75,139.62 in 1928.

Panama Canal

Number of Vessels Transiting Panama Canal each year from 1914 to 1928. An accompanying table shows the tonnage and tolls collected during each year.

Year	No. of Ships
1914	350
1915	1154
1916	1217
1917	1960
1918	2070
1919	2130
1920	2814
1921	2783
1922	2997
1923	5037
1924	4893
1925	4774
1926	5420
1927	6085
1928	6334
Total	50,018

Tolls charged for transit of the Panama canal as stated in the *Panama Canal Record* are as follows:

1. Merchant vessels carrying passengers or cargo, per net vessel ton (each 100 cubic feet) of actual earning capacity, $1.20.

2. Vessels in ballast without passengers or cargo, per net vessel ton (each 100 cubic feet) of actual earning capacity, $0.72.

3. Naval vessels other than transports, colliers, hospital ships, and supply ships, per displacement ton, $0.50.

4. Army and navy transports, colliers, hospital ships and supply ships, the vessels to be measured by the same rules as are employed in determining the net tonnage of merchant vessels, per net ton, $1.20.

5. Tolls may not exceed the equivalent of 1.25 per net registered ton as determined by United States rules of measurement, nor be less than the equivalent of 0.75 per net registered ton.

6. Vessels returning from Gatum lake to original point of entry into the canal, without passage through the locks at the other end, are charged tolls for one passage only.

7. Vessels transiting the canal from Cristobal to Balboa and return

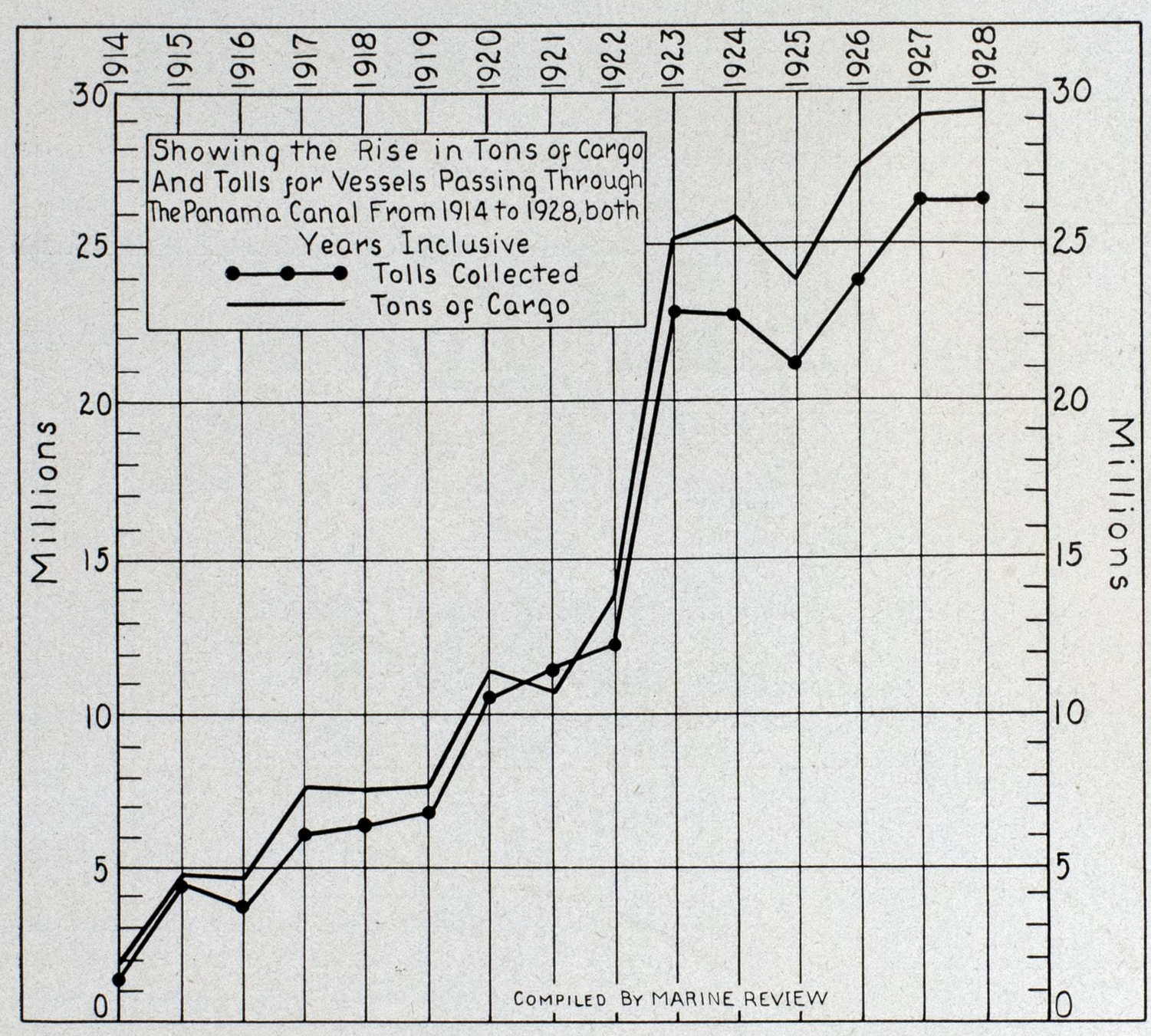
for the sole purpose of having repairs made at the Balboa drydock and shops will be exempt from payment of tolls, but a charge will be made for pilotage in such cases, as provided in paragraph 4 item 3 of the tariff and for handling lines in accordance with item 4 of the Panama canal tariff.

Full Tolls on Loaded Vessels

Full tolls are levied on loaded vessels and reduced tolls on vessels in ballast. "In ballast" is taken to mean a vessel which carries no passengers or coal, nor merchandise except bunker coal or fuel. In order that a vessel may gain the reduced or ballast rate, the amount of bunker coal or fuel must not be in excess of volume specified in the Panama certificate. Cases in which the amount of fuel exceeds the deductible allowance the full rate is charged. Vessels wishing to take advantage of the reduced or ballast rates should take special care to carry no more than the deductible allowance under the rules.

Vessels on arrival are required to show statements of their coal accounts, to which the master may be required to take oath. In order to expedite matters, coal in and out of bunkers should be piled in such a way as to be easily measured. Bunker allowances are computed by taking ¾ of the total volume of engine and boiler room space in cubic feet and dividing the result by 40 in case of coal and 37.7 in case of oil. The result obtained is the number of long tons allowed as bunkers.

Tolls charged for transiting the canal are based on the same measurement rules whether an American or a foreign vessel is making the transit. The methods for measuring as a basis for toll charges were determined after a careful and intelligent study of the entire subject of measurement rules and particularly those applying to the Suez canal, with the earning capacity of the vessel taken as a guide. The idea borne in mind when methods for toll assessment were decided upon was to make the rates low enough to attract traffic and at the same time have them sufficient so that when traffic increased the canal could be placed on a self-supporting basis.



Dual System of Measurement

For a ship to obtain the full benefit of the lowest possible charge, it is necessary at present that the net tonnage of the vessel transiting the canal be determined both in accordance with the Panama canal and United States rules for measurement. After measurement under both rules the vessel is permitted to claim toll assessment at the established rates per ton on the lesser of the two tonnages. Sometimes this works out in favor of the United States registered measurement, and in other cases the Panama canal measurement is the lesser.

A company which contemplates constructing a vessel for operation through the Panama canal should by all means have a thorough study made of the rules governing the measurement of tonnage both under United States registered rules and Panama canal rules in order to reduce to a minimum the total tonnage figure on which tolls are based. By attention to this important matter and complying with all of the requirements of the Panama canal rules thousands of dollars in canal tolls may be saved. Shipping companies should make the necessary alterations where practicable to their present ships to comply with the rules in order to avail themselves of reduced tolls.

The Swedish motorship AMERIKALAND on account of the fact that her machinery and other spaces seem to almost ideally suit the rules for deductible allowances for such spaces, established a new record April 20, 1928, for low cost of tolls per ton of cargo. Engaged in carrying iron ore from Cruz Grande, Chile to Baltimore, the ship carried 21,600 tons and paid $4678.75 in tolls or a pro rata tolls cost of $0.2166 per ton of cargo. The previous record of $0.2176 was made by the AMERIKALAND March 28, 1927.

Defining Deductible Spaces

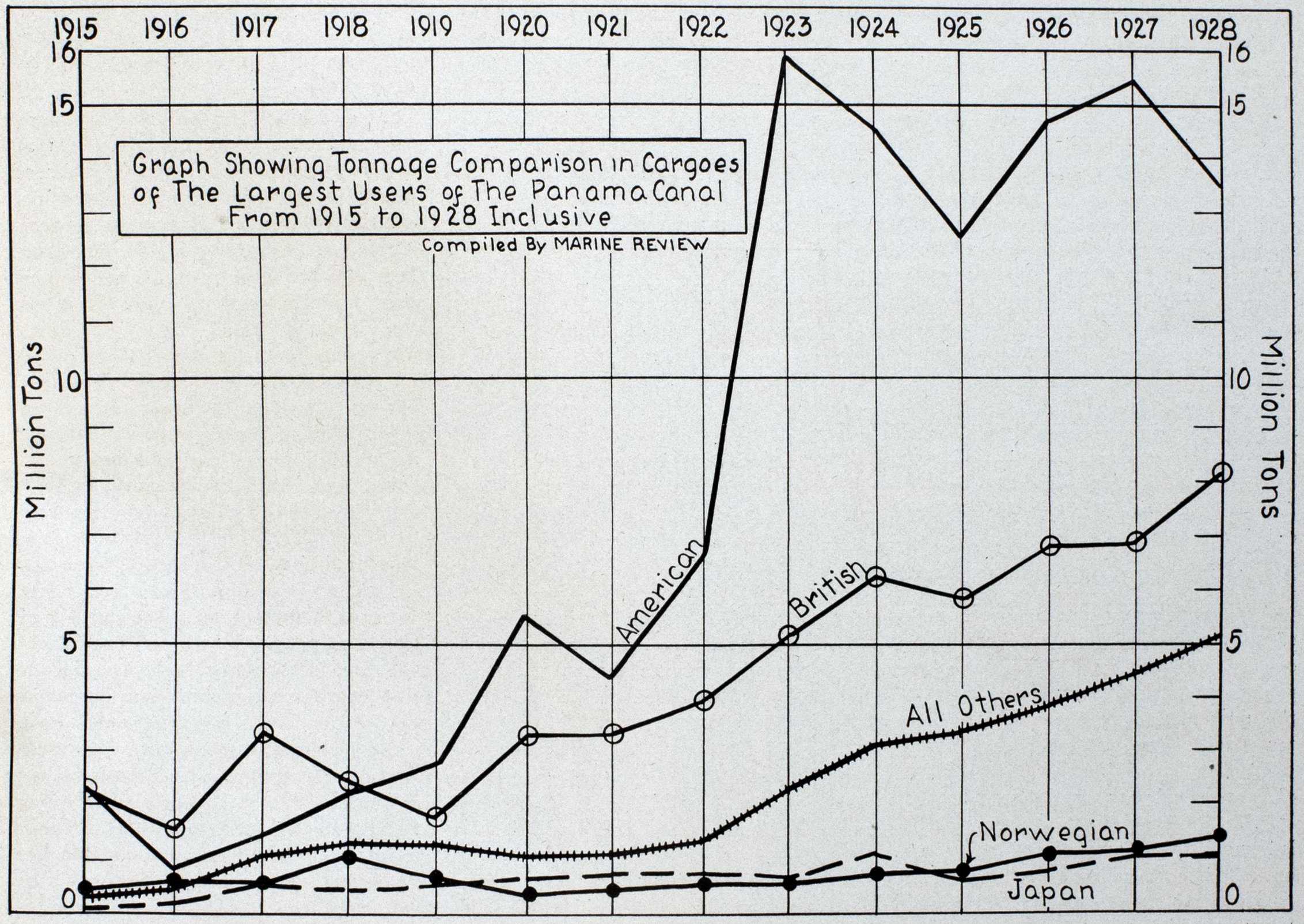
The main source of misunderstanding among ship operators regarding the assessments of tolls for transit of the canal is said in a report of the chief admeasurer at Cristobal to be in relation to exemptions of shelter deck, forecastle bridge and poop spaces with the consequent propelling power percentage adjustment necessitated by it. Vessels arriving for transit with the tonnage openings closed in a manner incompatible for exemption under United States rules, find that these spaces are included in the net tonnage as checked up by canal officials and that it results in an increase of from 500 to 2000 tons above the United States registered net tonnage with which the ship is nominally credited. Use of gaskets for battening around the tonnage openings eliminates such openings from exemption. A remeasurement of a vessel with openings neither calked nor battened results in greatly decreased toll bills. Faithful compliance with the rules of admeasurement is the surest way of enjoying the benefits of low tonnage rates.

Revised interpretations for measurement of ships, superseding all previous rulings and creating new practices were sent out in 1923 by the chairman of the board of admeas-

urement. These new interpretations referred specifically to qualifications for exemption from measurement of forecastle, bridge and poop spaces through tonnage openings and their temporary closures. This rule states that, "holes in or attachments to bulkheads, (except angle stiffeners, channel bars, etc. on inside or edges thereof, for taking hook bolts, cross pieces and shifting boards), indicating permanent means of closing tonnage openings, are not permitted. Exemptions are disallowed on vessels which arrive for transit with (a) holes in bulkhead plating, (b) cleats attached to bulkhead plating (c) stud bolts welded into, or bolts screwed through bulkhead plating, (d) hook bolts passing through bulkhead or hinged doors, when tonnage openings have been cut in them later. The use of both shifting boards and plates in channel bars is cause for disallowing exemptions.

Since changes made by the commissioner of navigation in United States registered rules of measurement must be in force at the canal, the double system of measurement, besides presenting difficulties to the canal administration results in further embarrassment in variation of tolls assessed for consecutive transits of vessels, while no alterations have been made in the vessel or even in the toll rates.

Slight differences in the size of openings, in fuel pump arrangement or other details, not based on the carrying capacity of the vessel often times result in different net tonnages for two vessels which are practically identical in construction and carrying capacity. An outstanding example of this is noted in the following: The GOLD SHELL and SILVER SHELL, two vessels of exactly similar dimensions and identical carrying capacity paid different amounts of tolls for the same transit. The tolls bill for the GOLD SHELL was $4368.25 while that for the SILVER SHELL was $5076.25. The reason for this was said to be a difference in location of a small fuel transfer pump. Another illustration of the apparent absurdities associated with the dual measurement system was the instance of a captain who forgot to remove cleats from a certain opening, his lapse of memory causing an additional $1200 in tolls. The absurdity lies not only in the forgetfulness of the captain but in the fact that whether the cleats were there or not had nothing whatever to do with the carrying capacity of the vessel.



For practically the entire time since the opening of the canal, the canal administration authorities have made efforts to do away with the extremely vexatious dual system of measurement. Bills with this purpose in view have been proposed and during the first session of the 68th congress, one of these bills passed the house but failed to gain the necessary vote in the Senate.

Tolls would be increased and a heavier burden would be placed on shipping if toll collection rates were placed under Panama canal rules alone. As an inducement to shipping interests, the bill concerned with elimination of the United States rules of measurement carries the provision that if passed, the President would issue an executive order reducing rates to $1 per net registered ton for vessel laden and $0.60 in ballast.

So great has been the trouble caused by the double system that, on two occasions, the governor of the Panama canal has attended conferences of officials of America flag steamship lines to urge acceptance of the bill making Panama canal rules the sole basis for measurement. Representatives of the companies, however, took the stand that unless a toll rate not to exceed 80 cents per ton for ves-

sels laden and a proportionate rate for vessels in ballast, based on Panama canal rules of measurement, were authorized, any change in the present system of measurement and toll rates at the canal would be opposed.

Panama canal administration authorities believe that the Panama canal rules, prepared by Emory R. Johnson, provide a much fairer indication of the earning capacity of a vessel than the United States registered rules of measurement. These officials admit, however, that assessment of tolls solely on the basis of Panama canal rules would result in somewhat higher tolls for some vessels, but that at the same time, the general effect on shipping would be a slight reduction in tolls.

Protests have been made by the railroads that freight rates by water are so low that transcontinental rail carriers are unable to meet the competition of intercoastal steamship lines operating through the canal.

A reduction of the toll rates for laden vessels to 80 cents per ton under Panama canal rules of measurement, with a proportionate lowering of the rate for ships in ballast, according to canal authorities, would cause a decrease in revenue from canal tolls of approximately 20 per cent, or of between four and five million dollars a year, on the basis of present traffic figures.

Tolls Paid by S. S. Virginia

As an illustration of the amount of tolls a vessel pays under Panama canal and United States rules for measurement let us take the VIRGINIA, the new passenger liner of the Panama Pacific line.

At the launching of the V'RGINIA at Newport News, Va., Aug. 18, 1928. P. A. S. Franklin, president of the International Mercantile Marine Co., delivered an address in which he referred to the fact that his company would have to pay more than $30,000 for each round trip of the new vessel because of the Panama canal tolls.

"Inasmuch as it was never intended that the Panama canal should be operated for any large profit," said Mr. Franklin, "it is to be hoped that the present basis of charging will shortly be modified by the government in order that the canal tolls may be more reasonable. In the meantime, however, this excessive charge is proving quite a handicap in the operation of the Panama Pacific line."

The net registered tonnage of the VIRGINIA, according to the United States rules of measurement is 12,167 tons. On the basis of the Panama canal rules for measurement, the net tonnage of the vessel is 18,160 tons. Applying the rate of $1.20 per ton by Panama canal rules, the tolls which the VIRGINIA would pay would amount to $21,972. Based on her United States registered tonnage of 12,167 the amount of tolls paid by the VIRGINIA would be $15,208.75. By taking advantage of the lower tonnage which the vessel making the transit has the privilege of doing, a saving of $6583.25 in tolls per transit is realized by the owner. If the dual method of measurement were eliminated and tolls were assessed on the basis of Panama canal rules at the proposed rate of $1, the tolls paid for the VIRGINIA for transiting the canal would be $18,160, still $2951.25 higher than under the present system. It is quite evident from this illustration just why companies operating vessels through the Panama canal refuse to relinquish their rights and privileges under the present dual measurement system.

Tolls Should Be Reduced

Revision of Panama canal tolls, suggested as a matter of justice to ship owners in view of the continued increase in revenue, rests in the final analysis with congress, and favorable action should be taken. As a limiting factor in toll reduction, Colonel Walker stated in his annual report for 1928 that heavy expenditures are being considered for increasing the capacity of the canal since there is well grounded reason to believe that if the use of the canal continues to increase proportionately as it has in the past, it will be unable to handle the traffic.

Growth of traffic through the canal has brought to the front consideration of the possibility of its exceeding the capacity of the canal with the corollary of considering ways by which the capacity may be increased. Present traffic is considered to be between 45 and 50 per cent of that which the canal can handle as constructed at present. The first move to provide for future increases and to insure sufficient depth of water in the cut and over the sills of the locks has been begun in the development of a supplementary water supply. It is believed that this with eventual construction of a third flight of locks, paralleling the present twin flights will increase the present capacity of the canal by about 70 per cent. The development of this new water supply was authorized by congress in 1928 when provision was made for a great dam at Alhajuela, the estimated cost of which is about $12,000,000. The time required for construction will be about five years. The dam is to be 170 feet high and will create 22 square miles of reservoir with a storage capacity of 22,000,000,000 cubic feet of water.

Speaking of reduction of tolls in his report for the fiscal year 1928, Colonel Walker said, "Policy in this respect is for determination by congress. It is pertinent, however, for the administration of the canal to point out that heavy expenditures are yet due to be made for additions and replacements in the plant for the adequate quartering of employees, for suitable retirement for employees grown old in this exacting service, that tolls at Panama are lower (by approximately a third at present), than the tolls at Suez; that reductions will benefit foreign trade as well as United States vessels in the domestic trade; that the intercoastal lines are competing severely with the railroads and a lowering of tolls may cripple all the internal transportation system of the United States while reducing the government revenue with offsetting benefits accruing only to special interests.

"The excess of total earnings over total expenses at the beginning of the fiscal year stood at 98,915,439.82. In this there is no consideration of interest charged on the investment. At three per cent on $275,000,000 it would have amounted to $115,500,000 for the 14-year period. Against this the operating earnings aggregate to date leave a deficit." General Goethals in 1926 opposed reduction in canal toll rates and said among other things: "I am opposed unalterably to any present reduction in tolls. The Panama canal is an obligation of the present generation and must not be a burden upon posterity. If it is not self-supporting then the taxpayers will be called upon to pay. That I think you will agree is irrefutable logic.

Should Build up a Surplus

"The canal must earn through tolls money sufficient to pay all operation expenses, fixed charges (including our annual $250,000 payment to Panama) and amounts needed for the purpose of amortization—maintenance of fortifications of course being a legitimate charge against the national treasury. The fact that the canal is now earning a surplus constitutes in my belief no reasonable grounds for reduction of tolls. The only way to safeguard the canal against any future contingencies is to build up a surplus of significant proportions.

"Viewed from any angle, reduction in toll rates would not result in lower

(*Continued on Page* 102)

MEN of MARINE AFFAIRS



JOSEPH HODGSON
Vice President, New York & Cuba S. S. Co.



JOSEPH S. WOOD
President, Wilson Transit Co.



A. F. HARVEY
President, Pittsburgh S. S. Co.



HENRY HERBERMAN
President, Export S. S. Lines

Photos by Blank-Stoller, Inc.

New York Ship Repair Plants Combine

Plants Shown Below, with Names Noted, Were Consolidated, on March 1, 1929, as Separate Units Into One Large Organization Known as United Dry Docks Inc.



Above—James Shewan & Sons, Inc.



Above—Morse Dry Dock & Repair Co.

Below—W. & A. Fletcher Co.



Above—Staten Island Shipbuilding Co.



Below—Alderton Dry Docks



Above—Theodore Crane's Sons Co.

—Photos by Fairchild Aerial Surveys

Heads Sales Department Marine Steam and Diesel

Effective Feb. 1, a marine and diesel engine section of the sales department was created at the South Philadelphia works of the Westinghouse Electric & Mfg. Co., with Carl J. Lamb as section manager. This section will handle all marine and diesel engine negotiations and other matters pertaining to marine sales.

Mr. Lamb has had considerable experience in the marine and diesel field. He was educated at the United States Naval academy and in the World war was an engineer officer aboard the U. S. S. HENDERSON. He is a lieutenant in the United States naval reserve. Before becoming associated with the Westinghouse company, Mr. Lamb had spent considerable time as as engineer officer on both steam and diesel engine vessels and holds an unlimited tonnage chief engineer license for both steam and diesel.

He is a member of the following societies: Society of Naval Architects and Marine Engineers, American Society of Naval engineers, United States Naval institute, National Security league, United States Naval Reserve Officers' association, the Military Order of Foreign Wars, and the United States Naval Academy Alumni association of Philadelphia.

Since joining the Westinghouse company in 1922, Mr. Lamb has been associated with the marine service, engineering and sales departments of that company.



CARL J. LAMB

May Call for New Bids on Three Matson Liners

The Matson Navigation Co., which opened bids recently for the construction of three fast liners for its San Francisco-Australian service will be compelled to seek new bids and redesign the vessels unless more favorable offers are received. The Bethlehem's Union plant at Alameda, Calif., which was the low bidder, offering to build the three vessels for about $25,000,000, some eight million dollars higher than the figure of the Matson company officials estimate which was $6,500,000 for each of the vessels. Other bidders were Bethlehem Shipbuilding Co.'s Fore River plant, New York Shipbuilding Co., and Newport News Shipbuilding & Dry Dock Co.

The new vessels when completed will be the largest ships constructed in the United States, will be approximately 25,000 gross tons, 720 feet in length and will have a speed of more than 18 knots.

According to a cablegram received Feb. 27 by the department of commerce, the British Blue Star Steamship line is to equip its 26 vessels for burning pulverized coal as fuel.

Name Delegates to Safety Conference

An international conference to revise and amend the convention of 1914 for safety of life at sea was proposed by the British government in a note transmitted to the state department from the British embassy under date of Sept. 30, 1927. To this note was attached a memorandum of proposals prepared by the British board of trade for the revision of the convention with the inquiry whether, in the opinion of the United States, the proposals of that memorandum formed a suitable basis for the discussion of the amendment of the 1914 convention.

The convention of 1914 was drawn up at a conference held in London, November, 1913, to January, 1914, resulting from the loss of the TITANIC in April, 1912, and was signed on Jan. 20, 1914, by representatives of Germany, Austria, Belgium, Denmark, Spain, United States, France, Great Britain, Italy, Holland, Norway, Russia and Sweden.

The main provisions of the convention of 1914 relate to the safety of navigation of the destruction of derelicts, the study and observation of ice conditions, the maintenance of the ice patrol in the North Atlantic and other measures, to the construction of vessels, to radio-telegraphy, life saving appliances and fire protection on vessels, and to safety certificates. The convention was ratified by some of the signatory states but not by all of them. It has not been ratified by United States. Owing to the war and other causes the convention was not brought into force completely as a convention in any country though parts of it have been adopted and put in force by several countries under their national law.

The proposals for the revision of the convention received from the British embassy were brought to the attention of the departments of war, navy, treasury, commerce and agriculture and to the United States shipping board for an expression of their views in regard thereto. As all of the departments concurred in the view that the convention required amendment, the department of commerce was charged with the organization of technical committees to study the proposals of the British board of trade. These committees have been working for a year and have nearly completed their conclusions on the various subjects to be discussed at the conference.

The date of the conference has been fixed by the British government for April 16, 1929, and it is understood that, in addition to the United States, invitations have been sent to the British dominions, India, Belgium, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Russia, Spain and Sweden. An invitation to be represented ad audiendum has also been sent to the League of Nations advisory and technical committees for communications and transit.

The list of delegates aproved by the President to represent the United States at the International conference, with an indication of the interest which each represents, is as follows:

Honorable Wallace H. White of Maine, house of representatives; Charles M. Barnes, chief of the treaty division, state department; Rear Admiral George H. Rock, bureau of construction and repair, navy department; Captain Clarence S. Kempff, hydrographer, navy department;

(*Continued on Page* 96)

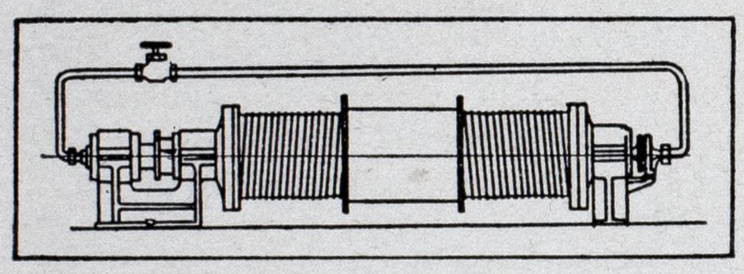
Patents Show Marine Development

Latest Marine Inventions Described

Specially Prepared for Marine Review
By Richards and Geier
Patent Attorneys, 274 Madison Avenue, New York

THE present invention relates to an improved lowering gear for lifeboats.

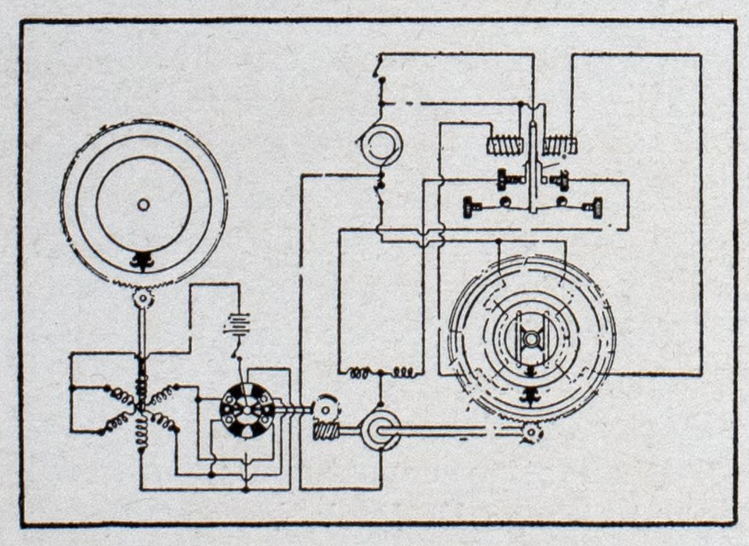
The invention substantially consists in replacing the usual davits by two supporting frames having a hinged portion and formed at the upper portion as a continuous inclined plane provided with railways, the boat, when not in use, remaining suspended on a transversal beam carrying wheels at its ends, engaging the upper part of the inclined railways. In that position the hinged parts are generally turned inwardly, in order as not to project overboard, but when the boat has to be lowered, and is allowed to run down the inclined railways near the end of the outer part of the frames, it is automatically allowed to descend into the sea.



LOWERING GEAR FOR LIFEBOATS

U. S. Patent No. 1,701,007, issued February 5, 1929, to Romolo Libani, of Genoa, Italy.

THIS invention relates to improvements in a compass wherein a directional element is mounted within a container together with an electrolyte and said parts are electrically connected, there being a circuit for the electrolyte and an electroresponsive means operative on variations in the electrolytic resistance of said circuit produced by relative movement between the electrical connections for said directional element and electrolyte.

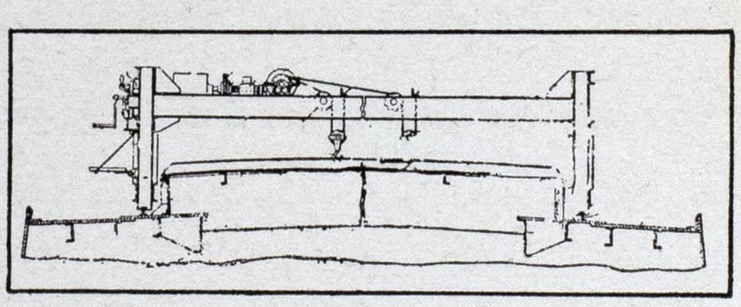


MASTER COMPASS

U. S. Patent No. 1,702,405, issued Feb. 19, 1929, to Edward L. Holmes, of New York, assignor to Holmes Navigating Apparatus Co. Inc. of New York.

WE HAVE made arrangements with the patent attorneys Richards & Geier, to publish data relating to letters patent issued in the United States covering inventions which may be of particular interest to our readers. The patents described, some of which have accompanying cuts partially illustrating the inventions, are all of recent date and we are planning, in subsequent issues, to publish similar information on patents pertaining to various phases of marine development work. Should our readers be interested in obtaining a printed copy of any of the patents appearing in this issue, or any other patent desired, such copies may be had by addressing request to the editor or directly to the contributors of this page.

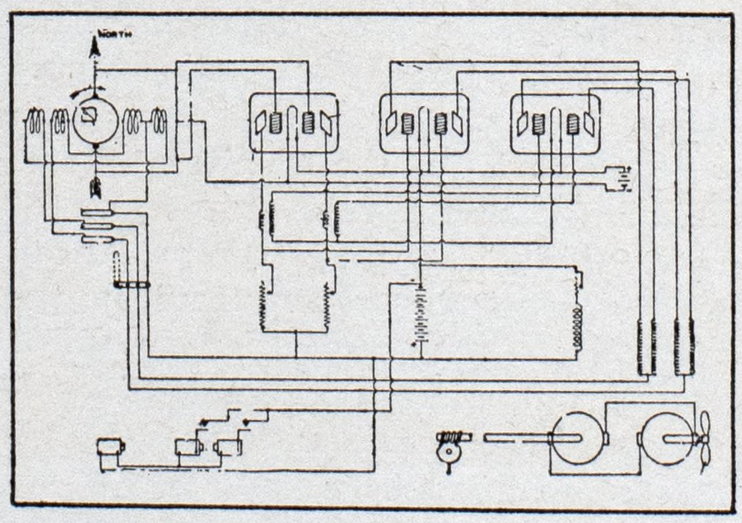
THIS invention relates to freight boat construction and particularly to the hatches, their covers and mechanism for handling the same.



HATCH COVER

U. S. Patent No. 1,701,965, issued Feb. 12, 1929, to Joseph S. Wood, of Cleveland Heights, O.

THIS invention relates to the control of stabilization of ships and the like, in response to the combined effect of the angular deviation of the body to be stabilized from its predetermined direction, and also of one or more derivatives of this deviation.

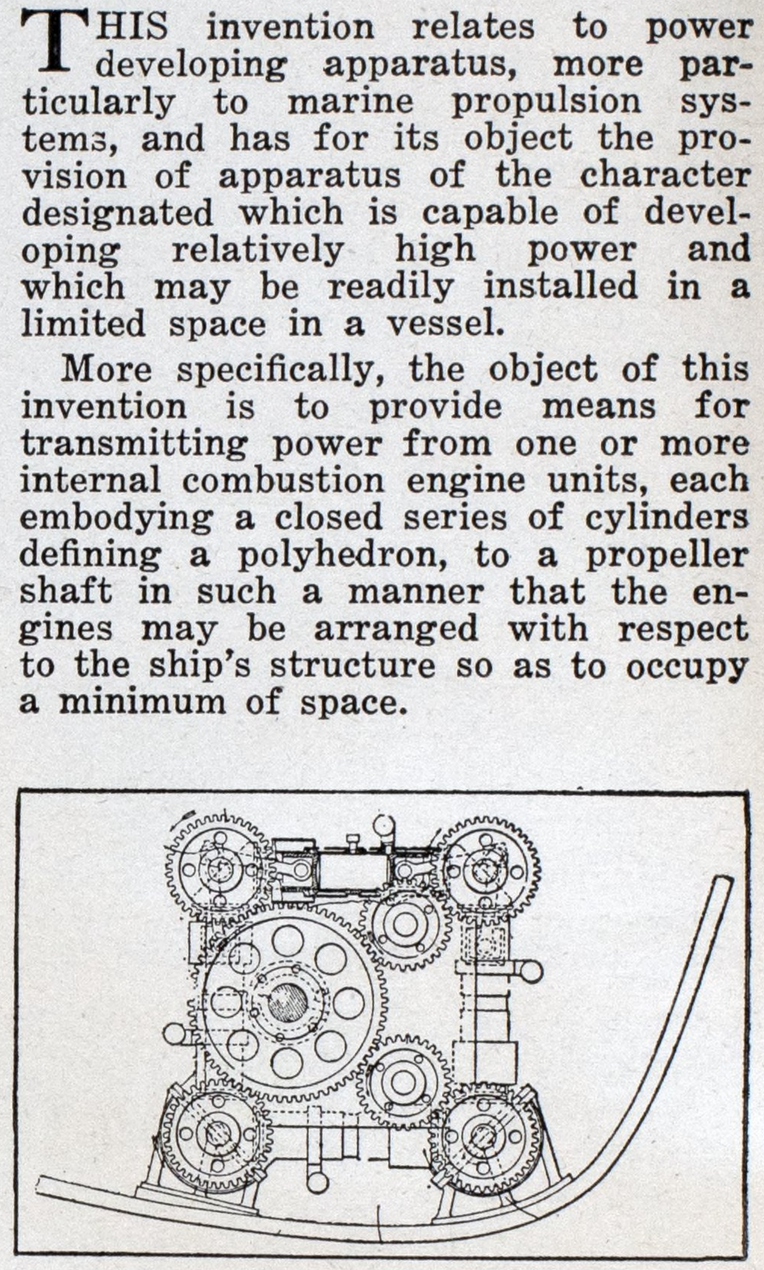


DIRECTIONAL STABILIZER

U. S. Patent No. 1,703,280, issued Feb. 26, 1929, to Nicolai Minorsky, of Belmar, N. J.

THIS invention relates to power developing apparatus, more particularly to marine propulsion systems, and has for its object the provision of apparatus of the character designated which is capable of developing relatively high power and which may be readily installed in a limited space in a vessel.

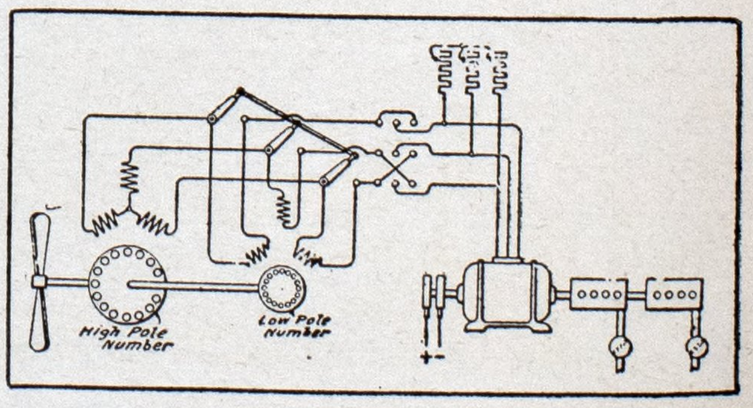
More specifically, the object of this invention is to provide means for transmitting power from one or more internal combustion engine units, each embodying a closed series of cylinders defining a polyhedron, to a propeller shaft in such a manner that the engines may be arranged with respect to the ship's structure so as to occupy a minimum of space.



MARINE POWER INSTALLATION

U. S. Reissued Patent No. 17,218, reissued Feb. 19, 1929, to Alexander T. Kasley, of Moore, Pa., assignor to Westinghouse Electric & Manufacturing Co.

THIS invention relates to electric ship propulsion and particularly to systems of ship propulsion where the propellers are driven by polyphase induction motors of the squirrel cage type. The invention has for its object an improved combination and arrangement of electrical apparatus for ship propulsion systems in which the first cost is low and in which there is provided a simple and efficient control of the speed and direction of rotation of the propeller.



ELECTRIC SHIP PROPULSION

U. S. Patent No. 1,701,368, issued Feb. 5, 1929, to Henry M. Hobart, of Schenectady, N. Y., assignor to General Electric Co.

Shipbuilders Elect Smith Head of Council

At the annual meeting of the National Council of American Shipbuilders held Wednesday March 19 for the election of officers for the ensuing year, H. G. Smith, vice president of the Bethlehem Shipbuilding Corp. was elected president, succeeding Homer L. Ferguson. Mr. Smith will be chief executive officer of the council in charge of its work and policies.

Other officers elected include: vice president, Fred P. Palen, vice president of the Newport News Shipbuilding Co.; counsel and treasurer, Henry C. Hunter; secretary, C. C. Knerr. The directors are as follows: William S. Newell, Bath Iron Works Corp.; Warren Johnson, Johnson Iron Works, Dry Dock & Shipbuilding Co. Inc.; George W. Roper, Norfolk Shipbuilding & Dry Dock Corp.; C. Stewart Lee, Pusey & Jones Corp.; L. Y. Spear, Nelseco Plant, Electric Boat Corp.; S. W. Wakeman, Bethlehem Shipbuilding Corp. Ltd.; C. L. Bardo, New York Shipbuilding Co.; Homer L. Ferguson, Newport News Shipbuilding Co.; Robert Haig, Sun Shipbuilding & Dry Dock Co.; D. W. Niven, General Electric Co.; I. W. Jackman, Worthington Pump & Machinery Corp.; A. E. Ballin, McIntosh & Seymour Corp.; C. W. Middleton, Babcock & Wilcox Co. and M. B. Lambert, Westinghouse Electric & Mfg. Co.

Board Sells Cape Romain To Insular Line

The steamship CAPE ROMAIN was sold by the shipping board Feb. 28, to A. H. Bull Steamship Co for the sum of $48,955 cash, with the understanding that not less than $150,000 will be spent on reconditioning and improving the vessel. The purchasers plan to make the CAPE ROMAIN serviceable for the Bull Insular line route which covers Atlantic ports of the United States and Porto Rico.

The vessel is a coal burning steel cargo ship of 7371 deadweight tons equipped with scotch boilers and reciprocating engines and designed to steam at ten knots. She has been laid up since November.

New Passenger Line to South America

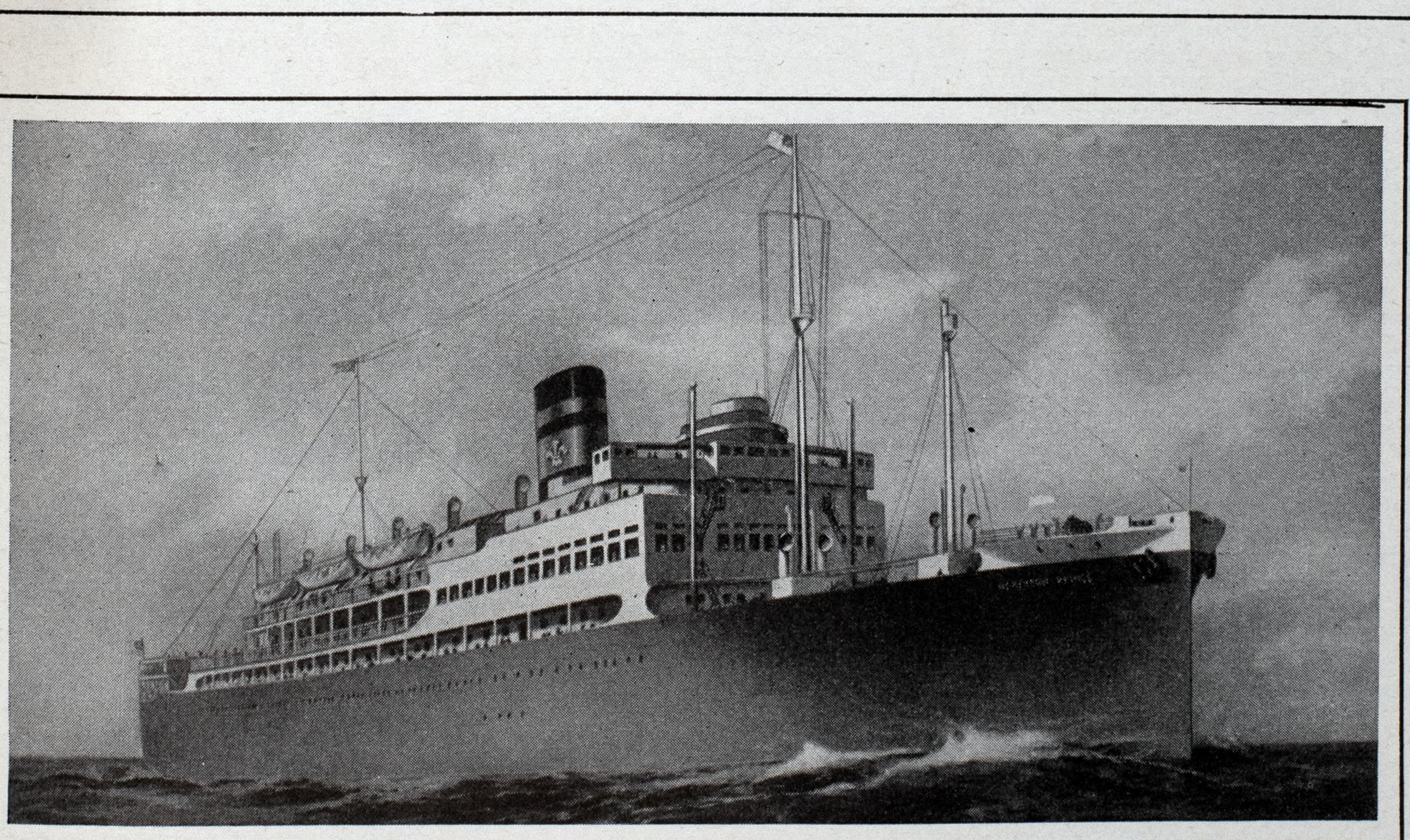
INAUGURATION in May of a new fortnightly express passenger service between New York, Rio de Janeiro, Montevideo, Santos and Buenos Aires, has been announced by the Furness-Prince line. Four fast luxurious motorliners now under construction for the South American trade are rapidly nearing completion in Great Britain.

These four motor liners which are to enter the important trade linking the East Coasts of the two great America's are named the NORTHERN PRINCE, EASTERN PRINCE, WESTERN PRINCE and SOUTHERN PRINCE. No expense has been spared in making the "four princes" the last word in ship construction as it is the company's desire to do its part in developing the great passenger and freight traffic between the United States and the Latin American republics.

Dimensions of the four new liners are: length, 517 feet; beam, 65 feet; displacement, 17,350 tons. Their propulsion machinery consists of powerful twin diesel engines developing 10,500 brake horsepower, giving a speed in excess of 18 miles an hour. This type of propulsion is noted for its cleanliness an important factor in passenger ship operation.

The NORTHERN PRINCE will be the first of the "four princes" to take her place among the great fleet of ships that ply in and out of New York over the great trade lanes of the world. She is scheduled to inaugurate the new service with a sailing from this port on May 11 and will reach Rio de Janeiro May 23, Santos May 24, Montevideo and

(*Continued on Page* 96)



M. S. Northern Prince—One of Four Motor Ships Entering Passenger Service of the Furness-Prince Line Between New York and East Coast South America

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

A CHARTER of a vessel "for about two months to about three month" was held, in the case of Britain Steamship Co. v. Munson Steamship Co., 25 F. (2d) 868, not to give the charterer the right to redeliver in less than two months. The whole phrase must be read together, said the court, to give reasonable and fair construction, and when thus considered, the parties contemplated that the ship would be used between minimum time and maximum. The words "to about three months" indicate that at the time of chartering there existed a probability of using the boat at least two months, or between two and three months. The adverb "about" no doubt was used to give a reasonable deviation in the period of time, with the right of redelivery at any time after the two months' period, but not anterior thereto, while the preposition "to" denotes the maximum limit of time for which the vessel was chartered.

* * *

REFUSAL by the first assistant engineer on a steamship of medical service tendered by the owner, and his employment of private physicians on his own responsibility, estopped him from claiming maintenance and care, it was declared in the case of Stewart v. United States, 25 F. (2d) 869. The court also held that such engineer's positive neglect of duty by failing to either supply a temporary equivalent for a missing part, such as a piece of wire or cord, or by failing to make a proper report and requisition for a missing chain either before or during the voyage, prevented full recovery for the loss of an eye, resulting from the bursting of a glass water gauge while he was repairing and testing it.

* * *

IN THE case of LLEWELLYN J. MORSE, 25 F. (2d) 973, it appeared that the vessel was purchased by Famous Players Lasky Corp. and thereafter transformed into a "prop" said to be "anything that goes to decorate a set," a replica of the ship CONSTITUTION, nicknamed "Old Ironsides," by building "false exterior hull, false decks, removal of the old masts, and the installation of three high masts and a long beam;" that the bulwarks and approximately one-third of the ribs of the ship were cut to put in gun ports, "rendering it unfit for commercial purposes," and "necessitated that the vessel be handled carefully;" that after the ship was transformed into a "prop," actors were hired to act in a picture; that the ship had no motive power, but was full-rigged and was towed by a tug to a point on the ocean off Catalina island, Calif. The ship moved along the island with sails set, and there the scenes were taken, representing a battle between other vessels and the CONSTITUTION and a fort on land. Dynamite was put in the mainmast, mizzenmast, and foremast, about 30 or 40 feet from the tops of the masts, which were 140 to 160 feet high. In the scenes, shots from the vessels and from the fort were fired, some of which were supposed to hit the tops of the masts on the CONSTITUTION and break them off. In reality, blank shots were fired, and simultaneously the explosives which had been placed in the masts were set off, causing their tops to break and fall. The court held that the ship was unseaworthy and that the owners were not entitled to limitation of liability for injuries and death of actors, resulting from explosions, where they had been ordered into the ship's rigging by the director who had full control and authority.

* * *

A SEAMAN may assign his maritime lien for wages for adequate and fair consideration, and if there be no fraud or over-reaching on the part of the assignee the lien will be enforced in admiralty at the suit of the assignee. The assignment of the claim carries with it the lien as security for the debt, whether the lien be mentioned in the assignment or not. —PRESIDENT ARTHUR, 25 F. (2d) 999.

* * *

AFTER a vessel has been arrested, unless the arrest is colorable, no maritime lien can arise against her. The marshal cannot create such a lien, and obviously her owner or master cannot.—Feldman v. American Palestine Line, Inc., 25 F. (2d) 1002.

* * *

IF BUNKERS are available, and can readily be taken on board, notice by vessel of readiness to load her cargo may be effectual to start the running of lay days, though there is an absence of bunkers sufficient for the needs of the chartered voyage at the time of giving notice. A somewhat similar rule seems to be applicable with respect to repairs that may be made after notice of readiness to load is given a charterer, it was said in United States v. Bowring & Co., 26 F. (2d) 91. If they are of a superficial nature, the notice may be binding. If, however, they are structural, and required in order to fit the vessel for her contemplated voyage, the notice may be of no avail.

* * *

UNDER the doctrine of the maritime courts, seaworthiness includes not only fitness in respect to the hull, machinery and equipment, but also with respect to the preparation for and stowage of the cargo.—NIDARHOLM, 26 F. (2d) 92.

* * *

LIENS of innocent persons furnishing repairs and supplies for a fishing schooner, under the merchant marine act of 1920 were not extinguished by libel and forfeiture of the schooner by the government for smuggling liquor in violation of the revenue laws, and the claimants were entitled to recover the amount of their respective liens from the proceeds of sale; the lien of materialmen accrues by operation of general maritime law against the vessel itself, and is not dependent on possession, but follows the vessel wherever she goes.—THOMASTON, 26 F. (2d) 279.

* * *

STIPULATION in a bill of lading cannot relieve a shipowner from the discharge of his initial duty under the Harter act to use due diligence to furnish a seaworthy vessel; and, even if damage result through fault or error in management, the exception of the Harter act cannot be availed of unless the vessel was seaworthy when she sailed, or due diligence to make her so had been exercised. A shipowner cannot delegate to a repair man his obligation to make the vessel seaworthy.—Standard Oil Co. v. United States, 26 F. (2d) 385.

* * *

IT IS a primary rule of navigation, said the court in Dahlmer v. Bay State Dredging & Contracting Co., 26 F. (2d) 603, that all moving vessels shall maintain a careful and efficient lookout. The lookout is "both eyes and ears of the ship;" he must be properly stationed on the forward part of the vessel and must be held to a high degree of vigilance in that position. Neither the captain nor the helmsman in the pilot house can be considered to be "lookouts" within the meaning of the maritime law.

* * *

THE fact that scows were improperly moored in a canal would not bar recovery by their owner for collision, if the collision could have been averted by the exercise of reasonable diligence on the part of those in charge of the passing vessel.—Dahlmer v. Bay State Dredging & Contracting Co., 26 F. (2d) 603.

* * *

THE tug is the dominant mind and will of the tow. It is the duty of the master of the tug not only to give instructions as to steering boats in the tow, but also to see that such instructions are obeyed.—ROBERT H. COOK, 26 F. (2d) 710.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	534	2,345,973	550	2,391,154
January	528	2,416,692	543	2,385,658
December	554	2,369,709	559	2,342,928
November	516	2,237,046	550	2,418,097
October	596	2,666,360	589	2,571,403
September	545	2,424,887	543	2,362,154
August	580	2,533,877	622	2,733,727
July	602	2,526,107	564	2,415,168
June	537	2,386,509	602	2,645,954
May, 1928	580	2,498,280	590	2,463,196

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	98	263,790	56	163,324
January	86	243,505	63	187,612
December	106	309,214	72	213,261
November	88	229,598	36	89,931
October	91	250,902	48	137,352
September	84	238,234	43	122,389
August	96	266,104	58	161,365
July	101	254,378	60	143,573
June	101	270,069	72	183,534
May, 1928	110	281,648	74	179,108

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	96	289,629	58	196,264
January	94	294,036	47	164,132
December	100	312,100	69	214,047
November	107	315,954	74	214,574
October	112	347,432	72	221,761
September	113	383,749	77	245,068
August	130	340,569	107	270,757
July	155	378,368	111	289,121
June	143	319,611	100	254,906
May, 1928	134	304,575	103	231,851

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	19	46,400	17	46,121
January	20	59,830	21	61,434
December	25	61,251	25	62,930
November	20	37,250	19	33,408
October	23	39,959	22	40,588
September	30	53,338	30	51,018
August	30	48,256	28	47,078
July	38	68,208	38	66,389
June	30	40,255	25	33,834
May, 1928	23	26,648	19	28,673

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	2	5,891	4	17,323
January	7	24,095	4	17,289
December	6	20,741	8	32,974
November	10	35,147	9	20,551
October	6	14,667	9	20,551
September	5	18,895	3	12,777
August	7	28,611	4	19,978
July	8	26,920	7	25,451
June	8	35,177	7	25,741
May, 1928	7	21,068	4	12,765

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	35	137,304	48	181,425
January	....	.....	....	.....
December	39	144,128	56	205,572
November	30	115,469	53	198,195
October	42	154,623	62	224,018
September	41	150,368	57	203,758
August	35	136,504	47	172,693
July	30	111,042	46	157,354
June	23	85,328	40	144,572
May, 1928	25	96,976	44	159,070

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	127	397,147	132	410,667
January	126	386,102	122	372,302
December	127	392,832	134	400,355
November	134	412,100	134	417,523
October	133	402,263	131	406,142
September	119	374,500	128	396,749
August	133	404,303	144	440,016
July	128	378,827	121	353,758
June	127	392,580	135	412,620
May, 1928	135	413,038	151	439,278

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	20	55,902	58	155,238
January	18	36,737	61	154,970
December	32	73,123	90	223,258
November	19	58,171	77	209,023
October	12	33,817	66	173,729
September	21	64,366	69	178,508
August	19	50,096	83	208,639
July	15	33,548	81	212,471
June	19	42,454	63	155,944
May, 1928	25	58,472	78	207,857

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
November, 1928	26	64,406	27	67,621
October	23	55,147	22	53,094
September	40	89,032	42	94,981
August	37	85,186	34	83,694
July	30	81,634	31	79,222
June	26	54,449	28	57,111
May	26	58,800	28	63,779
April	26	68,581	26	61,939
March	25	65,435	28	68,630
February, 1928	31	70,881	28	58,896

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	84	104,667	73	90,947
January	82	98,373	79	99,243
December	79	79,816	72	79,354
November	98	81,666	101	82,863
October	120	111,450	116	106,139
September	84	60,079	86	62,698
August	91	73,771	89	69,532
July	86	65,838	88	67,720
June	98	83,417	93	78,006
May, 1928	134	117,930	129	112,303

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	85	202,594	69	164,847
January	....	.....	....	.....
December	100	234,963	89	212,341
November	91	203,865	77	184,537
October	89	185,031	71	166,606
September	85	209,709	74	193,661
August	90	186,097	78	178,036
July	101	209,990	82	189,008
June	85	176,088	82	178,337
May, 1928	102	227,194	90	209,449

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	53	222,462	55	225,789
January	60	242,464	73	290,077
December	62	249,729	63	259,823
November	68	285,564	75	306,605
October	62	245,420	60	243,778
September	57	229,718	66	254,503
August	55	220,858	53	228,378
July	64	261,850	58	228,946
June	44	180,482	44	185,765
May, 1928	53	206,254	61	239,241

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	248	682,052	249	675,432
January	273	710,969	282	744,078
December	274	762,019	260	690,010
November	252	690,157	263	716,105
October	259	682,184	329	627,989
September	228	617,636	248	661,643
August	264	667,055	265	690,341
July	260	659,457	245	615,234
June	253	615,672	263	640,136
May, 1928	263	671,333	261	647,504

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
December, 1928	20	46,569	17	43,041
November	22	56,983	22	50,043
October	24	59,136	26	61,673
September	21	60,956	22	54,537
August	24	62,574	26	63,874
July	26	59,204	27	61,976
June	17	37,881	20	41,123
May	29	71,467	32	78,731
April	26	60,165	21	52,590
March, 1928	29	79,789	27	67,472

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	37	96,127	81	256,077
January	45	133,396	106	347,297
December	45	129,285	107	355,592
November	49	150,205	109	351,063
October	41	110,825	135	420,534
September	26	69,433	98	313,816
August	31	91,959	78	261,804
July	41	91,686	68	196,424
June	20	52,884	64	210,110
May, 1928	35	96,852	44	126,027

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	150	470,851	157	484,043
January	193	581,357	191	536,504
December	199	551,301	154	487,064
November	209	541,906	179	514,647
October	221	568,910	216	515,889
September	188	504,630	189	482,133
August	164	539,454	160	514,978
July	153	547,612	131	485,817
June	152	434,811	114	428,885
May, 1928	236	545,132	150	478,553

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
February, 1929	153	603,008	130	484,085
January	135	587,423	142	560,239
December	155	607,902	152	582,612
November	157	504,269	157	589,810
October	165	620,117	155	596,750
September	180	623,999	175	579,262
August	185	674,832	164	643,965
July	147	662,437	122	454,802
June	149	567,839	141	539,600
May, 1928	174	869,626	175	625,910

Port Arthur

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1928	24	78,538	33	109,230
June	25	80,481	25	79,758
May	27	92,323	28	90,108
April	24	73,693	26	88,253
March	46	127,039	47	131,741
February	47	144,273	44	144,508
January	20	69,947	20	72,185
December	23	67,105	21	68,602
November	21	64,277	25	80,084
October	18	50,632	25	82,177
September, 1927	16	51,492	29	83,728

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 40 of 141,279 net tons entered and 73 of 241,022 net tons cleared for the month of February.



Modern Stevedoring and Dock Management

Practical Ways to Cut Costs in Cargo Handling

How to Improve Service to Ships

Conducted by H.E.Stocker

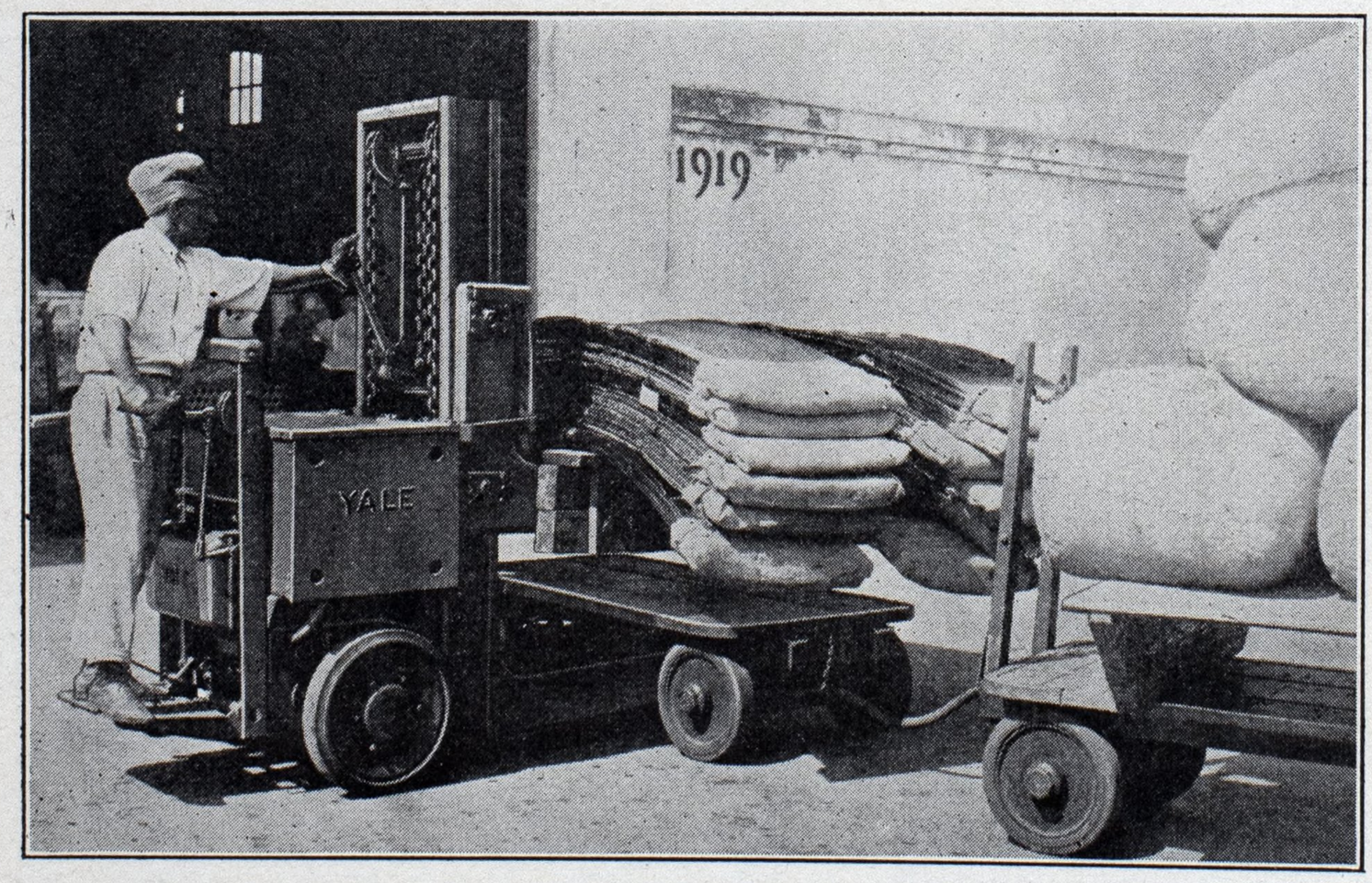


Proper Equipment Reduces Handling and Expedites Cargo Movement

THE subject of tractors and trailers, versus skids and lift trucks is controversial. In discussing it I do not intend to take sides where matters of opinion are involved. Rather, my purpose is to state well established principles, cite facts which can be substantiated, and finally, to make suggestions for increasing the availability of facts. My only interest is the lowest possible cost consistent with first class service to shippers, and prompt dispatch of the ship.

Principal advantages of either tractors or skids and lift trucks are, the reduction of handling, quicker movement of cargo in a horizontal direction, and handling in heavier units. The tractor trailer plan obtains these advantages by use of four wheel trailer trucks hauled by a gasoline or an electric tractor in trains of one to 32 loaded units, and as many as 56 empty units. The skid and lift truck plan obtains the same advantages by using skids instead of trailers and lift trucks in place of tractors. The load carrying unit, instead of being hauled, is lifted clear of the floor and then carried.

In both plans handling may be avoided by storing cargo on trailers or skids, rather than on the floor of the dock or the deck of the lighter, while awaiting delivery to the ship or to the consignee. The results of both plans of cargo handling have been a decided reduction in stevedoring costs, less checking and sorting, less claims, quicker dispatch of the ship and reducing costs incidental thereto; also improved service to the shipper and to the consignee by reason of quicker release of trucks, quicker delivery of cargo and less loss and damage to cargo.



Lift Trucks Loading Skids on Trailers at the Canal Zone

Practical Use of Both Systems

The Goodrich Transit Co. is the most notable example of the use of tractors and trailers. This company cut cargo handling costs 50 per cent, reduced claims, expedited dispatch of the ship and improved service to its patrons. Important reductions of costs and the other advantages mentioned have resulted from the installation of skids and lift trucks on the Weehawken terminal of the New York Central railroad, and on the terminals of the Southern Pacific Steamship lines at New York, New Orleans and Galveston, Texas.

From a paper entitled "Tractors and Trailers, Versus Skids and Lift Trucks," presented by H. E. Stocker, resident manager at New York for the McCormick Steamship Co., before a joint meeting of the Society of Terminal Engineers and the Materials Handling division of the American Society of Mechanical Engineers, held at New York, March 13, 1929.

Accurate records of total savings effected are not available, but an engineering survey of the performance of skids and lift trucks on the New Orleans terminal of the Southern Pacific Steamship lines showed that the saving effected would pay off the cost of the gasoline lift trucks in fourteen weeks, producing a return on the investment of 270 per cent a year. In spite of the difficulties of arriving at this figure, this information is of real value, because if the figures were cut in half the saving would be very substantial and would pay for the equipment in a relatively short time.

When comparing different methods or different equipment, it is advisable to review the principles concerned so that one may be properly guided. Furthermore, to review and study the principles from time to time is advisable because of new ideas and new viewpoints that often result. The two most important principles of cargo handling are, reduce handling to the minimum, and, incorporate versatility, maneuvering ability and ease of movement in the equipment used.

Reduce Handling of Freight

A certain class of equipment might be capable of reducing handling to the minimum, yet at the same time be so limited in its use, so difficult to maneuver in restricted spaces, and so difficult to move by hand, that its full use could not be availed of, or possibly at times the equipment could not be used at all.

It is clear that the less cargo is handled, the less costs will be, giving consideration always to the capital charges, maintenance and repair costs of the mechanical equipment used to reduce handling. Handling in large units reduces costs because each time a unit is moved several hundred pounds additional per unit is moved. Maneuvering ability, versatility and ease of movement should be incorporated in the equipment used to meet the varying conditions that are met with from day to day. Marine terminals are so often selected because of traffic reasons or because the terminal used is the only one available, that cargo handling equipment must be adaptable to the varying conditions on the terminal. Narrow congested piers jammed with street trucks and freight of all sizes and shapes prevent the use of equipment that may accomplish wonderful results on a larger pier handling cargo of a fairly uniform character.

The tractor trailer plan reduces handling, and provides maximum maneuvering ability, versatility, and ease of movement, by putting wheels on the load carrying unit, which is called a trailer. The wheels on the standard trailer are comparatively large (12-inch rear wheels and 10-inch caster wheels). They revolve on roller bearings. The casters are given ample lead and revolve on ball bearings in the caster plate. Efficient lubrication is provided throughout. These features permit easy movement of trailers by hand, an important feature in moving trailers in restricted places on the dock and in the ship. Maneuvering ability is provided by reason of the size (3 feet by 6 feet), the ability to turn in a complete circle on one rear wheel and the rounded corners which make it easier to get into and out of restricted places on ship and shore.

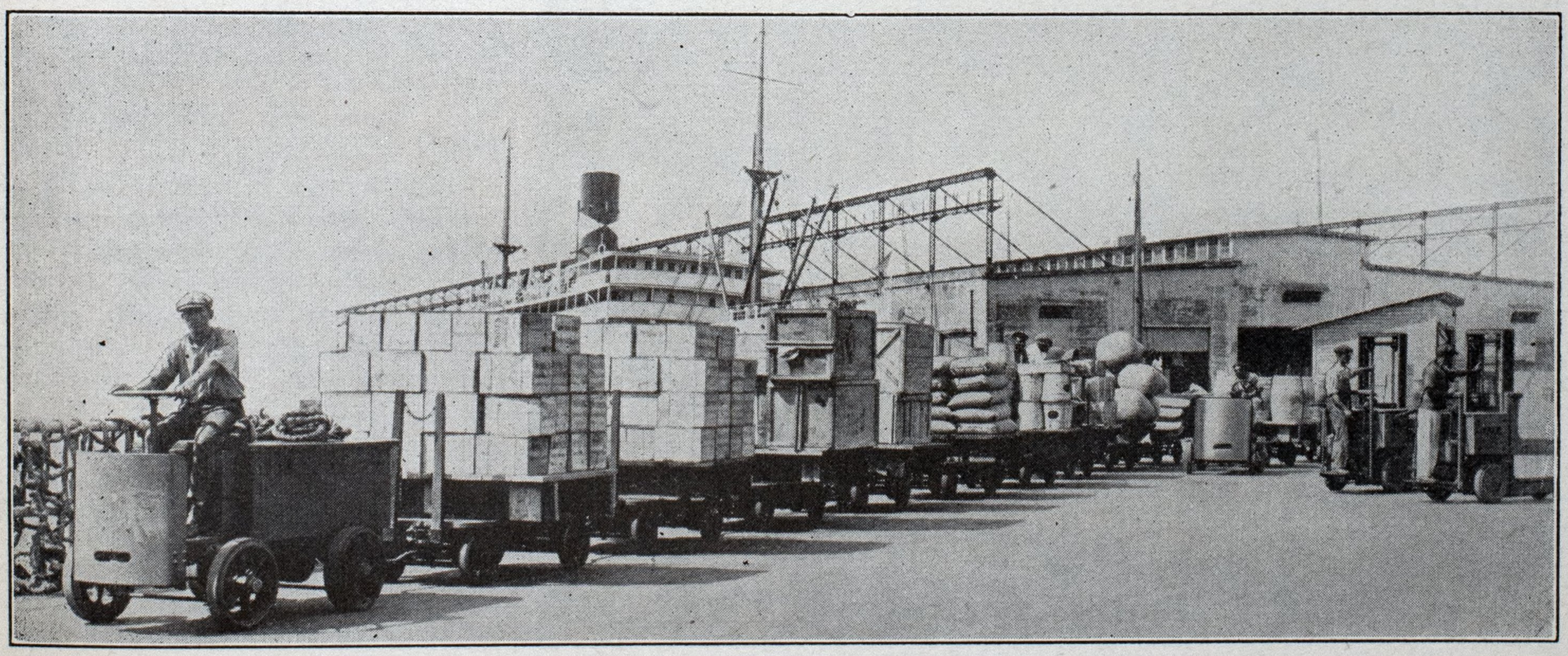


Two Wheeled Hand Trucks Used as Trailers at Eastern Steamship Co.'s Terminal, New York

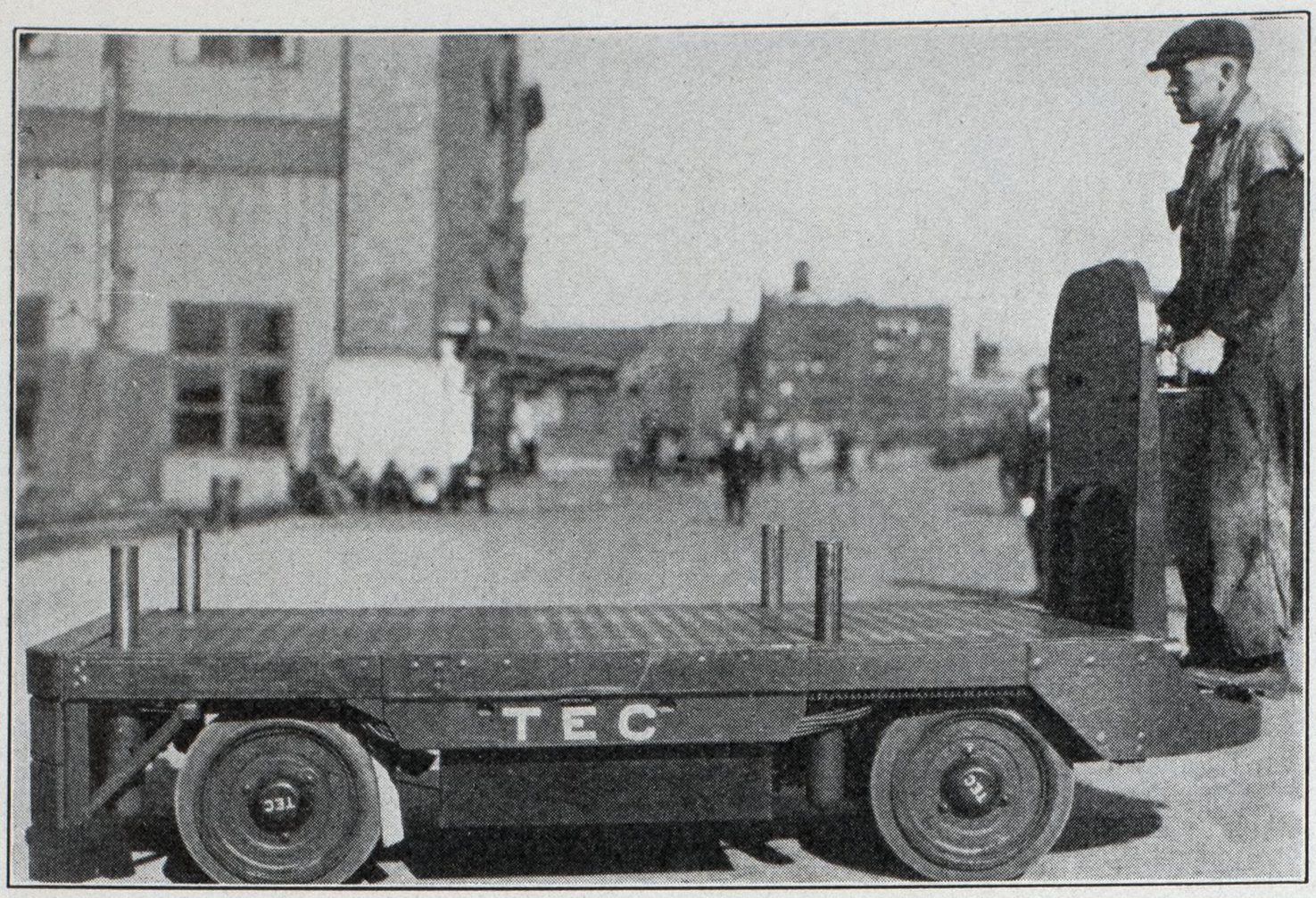
Wide Range of Capacity

Electric or gasoline tractors are used to haul trailers distances of 50 feet and over. Maneuvering ability of tractors is provided by the compact construction which permits a turning radius of as low as 51 inches.

The tractor trailer plan has the advantage of a wide range of capacities



Tractor Hauling Trailers Loaded with Skids at the Canal Zone



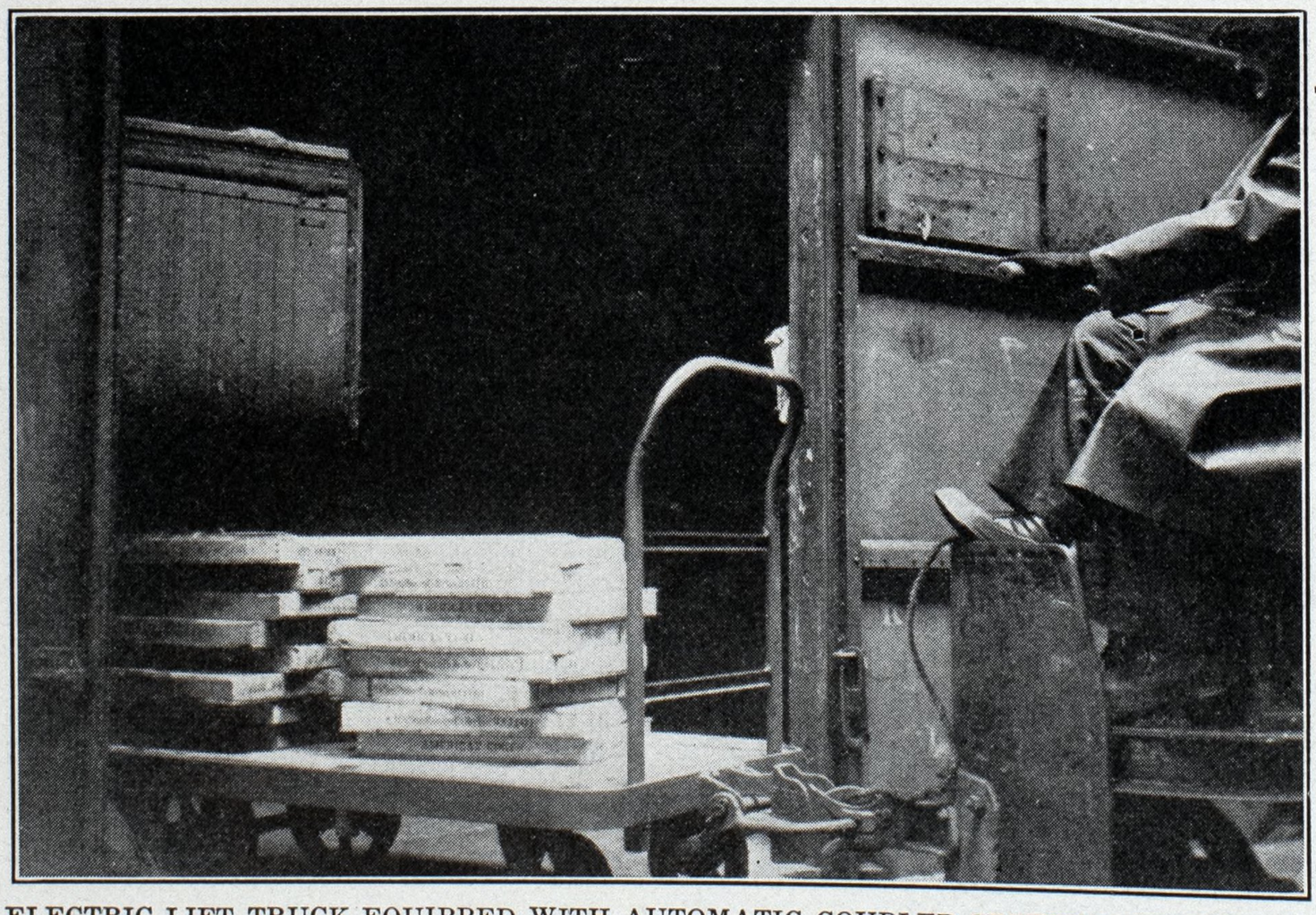
ELECTRIC LIFT TRUCKS WITH FOUR WHEEL DRIVE AND FOUR WHEEL STEERING

because the capacity can be increased or decreased as desired; this, combined with the maneuvering ability of the individual trailer and the tractor, gives a highly satisfactory versatility. Trailers may be spotted by tractors either by the tractor pushing the trailer into position, or by backing the trailer into position. This is possible because of the articular point between the load carrying unit and the power unit.

In the Orange Avenue freight station of the New York Central railroad at Cleveland, I have seen a gasoline tractor equipped with an automatic coupler connect with a trailer at an angle of 45 degrees, and then back two trailers and connect with a third. This was done during normal operation and not as a demonstration.

The skid and lift truck method reduces handling and provides maximum maneuvering ability, versatility and ease of hand movement in several different ways. The skid commonly used is called a dead skid. Sizes and capacities vary. It is clear that there must be a compromise between size and cubic capacity of skid and trailer. A small trailer may be advantageous because of its ability to maneuver in restricted spaces, but its small size reduces its cubic capacity. The reverse is true of a large skid or trailer. The selection of one or the other must depend on the conditions encountered.

The Weehawken Terminal of the New York Central railroad uses skids which are 42 inches wide and 72 inches long and rated to carry 6000 pounds. This skid cannot be moved economically without a hand or a power lift truck, unless it happens to be resting on the floor of a steel lighter or a similar smooth surface. To offset this difficulty, some skids are provided with wheels revolving on roller bearings to facilitate movement by hand. The wheels are not as large as those used in a standard trailer because the caster wheels must be small enough so as not to get in the way of the lift truck's platform, while the rear wheels must be less than the fixed clearance height of the skid. Properly designed couplings are also necessary if the live skids are to be used as trailers.



ELECTRIC LIFT TRUCK EQUIPPED WITH AUTOMATIC COUPLER SPOTTING TRAILER IN BOX CAR AT WESTERN MARYLAND PIER, BALTIMORE

Use Large Live Skids

The skids used by the American South African and other lines in this port are 8 to 10 feet long by 4 feet 9 inches wide, and have a capacity of 6000 pounds. The skids are equipped with wheels on one end only. This is so that the skids may be moved by hand when empty, but must be moved by power when the skid is loaded; the theory being that economical movement under load is possible only by use of power equipment. Maneuvering ability is provided in the electric lift truck used to handle these skids by four wheel steering and four wheel drive, instead of two wheel steering and two wheel drive found in other types of trucks. Versatility is provided by the ability of this truck to be used as a lift truck, a tractor, a crane truck, a newsprint carrying truck and a bale carrying truck. This special equipment is attached by simply running the lift truck under a special skid equipped with the crane, paper or bale carrying attachment, and plugging in an electric cable.

An example of extending the maneuvering ability of skids is offered by the Munson Steamship line which is equipping one of its terminals with several hand lift trucks for use in conjunction with gasoline lift trucks. The hand lift trucks will be used for short hauls and "switching" operations.

A combination of tractors and trailers and skids and lift trucks is used at the Canal Zone. The trailers are used to carry loaded skids on long hauls between docks. The loading and unloading is done by a lift truck with a high lift.

The Southern Pacific Co. at New Orleans uses tractors and trailers for long hauls and skids and lift trucks and also two wheeled hand trucks for short hauls. Other lines use tractors and trailers for handling regular cargo, but have hand lift trucks for handling shipments moving from factory to consignee on skids.

Shipments moving from factory to consignee on skids are steadily increasing and will undoubtedly continue to increase because shipping on skids broadens the application of the principles under discussions by extending them to all concerned; also because the advantages are so manifest and the economies so large.

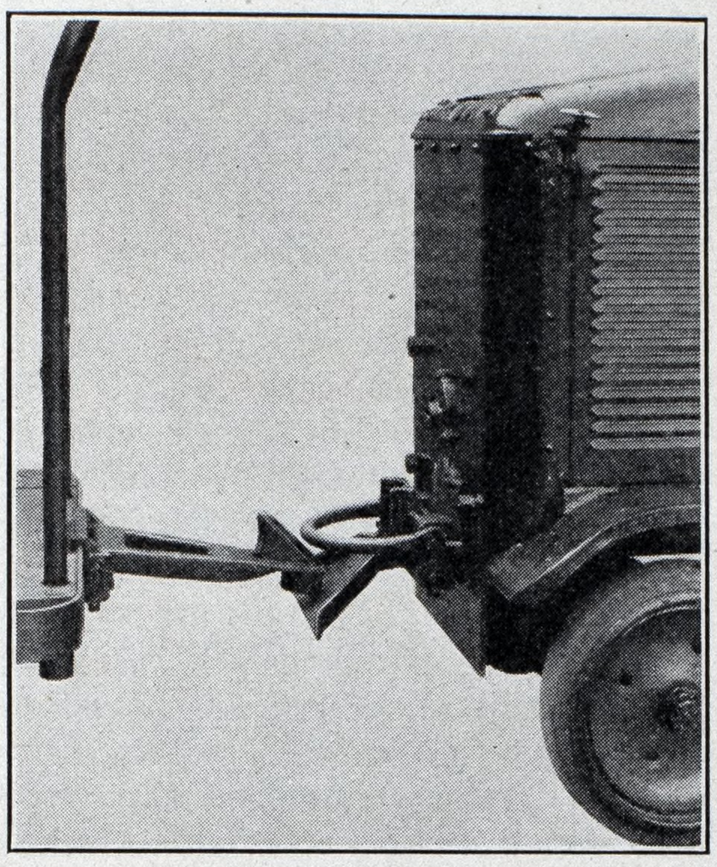
Saving in Use of Skids

This mehod has brought astounding economies in money and in time to shippers, trucking companies, railroad companies, water lines and consignees. The paper industry, which uses this method more extensively than any other industry, has reduced handling costs as much as 80 per cent, packing expenses 77 per cent, and has also effected large savings in time. The saving in time is well illustrated by the Champion Coated Paper Co. which reduced the time for loading a car from 21 man hours to one and one half man hours.

The department of commerce estimates that the minimum amount the country can save by shipping freight on skids, wherever practical, is $100,000,000 a year. This estimation is based on a thorough study of the advantages and possibilities of this method which was made as a result of the requests of the manufacturers of skids and lift trucks for the establishment of standards on their equipment.

When a definite decision must be made among the different methods of cargo handling, one is perplexed because of the many opinions which are encountered, and because of the scarcity of real definite facts on which these opinions are based. Too often a decision is based on an incomplete study of the terminal and the equipment. Many times a decision will be made between two makes of equipment, when a third make of equipment which is not considered, would have been more suited to the job.

The answer to this problem is found in an engineering survey by a competent engineer in conjunction with practical stevedores and shipping executives. One of the chief characteristic of an engineer is his



GASOLINE LIFT TRUCK AND TRAILER EQUIPPED WITH AUTOMATIC COUPLER

special training and experience in observing, recording and analyzing facts. An engineering survey means simply getting the facts, analyzing the facts and then deciding on a course of action based on the facts. When such a decision is not a clear cut deduction from the facts available, the decision is based on what has been done under the most similar conditions to be found elsewhere, even in other industries.

Regardless of statements to the contrary, shipping can learn from other industries because, although conditions are different, controlling conditions are not so different that details of equipment and methods cannot be adapted to shipping use. Although conditions on a marine terminal are vastly different than conditions in a factory or a warehouse, the same kind of equipment is often used; for example, two wheeled hand trucks, standard trailers, skids, etc. Conditions vary still more between a marine terminal and a farm, yet the same gasoline tractors are used in both cases. A competent engineer has a wide range of experience and knowledge of equipment and methods which guides him in making decisions.

A great difficulty in making a survey of a marine terminal is the inadequacy of the information available in company and other records. More information is available in the manufacturing industry because of the adequate statistical records kept by many manufacturing concerns and because organizations exist for the collection and the dissemination of information of great practical value.

Marine engineers, naval architects and traffic men are organized along these lines, but little is done in the cargo handling branch of the shipping industry, except the relatively small amount of time that is given the subject in the Society of Terminal Engineers and the American Society of Mechanical Engineers.

An arrangement for a closer cooperation between the engineering societies and those in the shipping industry interested in cargo handling, would be beneficial to all concerned. This would make facts and ideas more readily available, and would supply information which is now to be had only by laborious digging.

Cargo Interchange Can Be Speeded Up

BY A. W. SHAFFER

WITH the highly competitive nature of traffic moving through the Port of New York one must realize the importance of the movement of freight in and through the port, particularly when consideration is given to the fact that approximately 75 per cent of the total lighterage orders received by the railroads allow less than twenty-four hours from the arrival of the car at terminal yards to delivery at steamer's side.

It may be well to visualize what this means to the marine departments of the various railroads. Prior to July 1925 the marine department of the New York Central railroad, as well as other roads operating in the port, received car arrival notices from terminal yards by messenger or phone service, which in many cases resulted in valuable loss of time on account of messenger service or the possibilities of error in transmitting information by telephone.

With a view to expediting all details in connection with this phase of the operation, and particularly with thought toward overcoming the lost time of slow moving messenger service between the terminal yards and lighterage department, the marine department of the New York Central railroad during the winter of 1925 and 1926 made an exhaustive study of teletype operation with the result that today the New York Central railroad stands as pioneer in this field of endeavor, and offers to its patrons the first radical step by the introduction of mechanical appliances to place in the hands of the shippers quick and accurate information relative to the arrival of their cars at seaboard. Study is now being made

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to further improve this service by the extension of teletype lines to the classification yards at Dewitt, N. Y.

This mechanical installation has proven a great success and has not only given the consignee quick and accurate advice but reflects a decided saving in car days.

Having accomplished this the next problem was to relieve the piers of added congestion due to the quicker transmission of advice by the teletype installation and to improve methods in freight handling. Again mechanical appliances were put to use to improve the old and accepted method of freight handling. The handling of material is responsible for the major portion of human labor expended, and insomuch as the pier forces had apparently reached their peak in tons per man hours a comprehensive study was made of skid operation with the thought of reducing the number of handlings per unit. A superficial analysis of daily operations showed what labor in its entirety was expended in the moving of objects from one place to another; i.e., from car to dock, car to loft, dock or loft to boat, or car to boat direct, causing in many instances double or triple handling of freight and at what appears to be unwarranted and unnecessary expense.

Extending Mechanical Methods

The increase in cost of labor without an offsetting increase in efficiency to meet the increase in the number of short time permits, split deliveries, and other causes common to lighterage movement of freight, brought about by the general change in business methods, demanded serious consideration of the introduction of mechanical appliances and their intensive use.

It was not so many years ago that practically all materials were handled at piers by man power and push trucks; tractors and trailers then came into existence and are still used with more or less success in many of our large railroad terminals, but their use is restricted to certain classes of work and facilities at hand. The skid platform next came into use but was confined principally to industrial plants or interplant operation. Skid operation is comparatively new, especially in connection with lighterage movement of freight, but this method of handling freight is increasing rapidly. While we accept the skid as an innovation, and regard it as new, yet it represents the oldest method of transportation, its existence dating back through the history of transportation to the pre-historic age, for a skid platform is fundamentally the same thing as a sled or stone boat and was used generally for the moving of heavy objects from place to place before wheels were ever thought of, its first method of propulsion being by wedge, rollers, and human effort.

Some forty years ago a lift truck, not unlike the common garage jack of today, was invented. By the use of the oldtime sled and lift truck we were able to put forth this so-called new method of skid operation.

Power next was applied to the lift truck giving the accepted lift truck of today, enabling a faster movement of heavier loads than by any other means of transportation for this particular method of operation, for by power lift truck operation it is possible to move loaded skids weighing up to three or five tons at a speed varying from 400 to 500 feet per minute as compared with the old method of man powered hand trucks moving with approximately 500 pound loads at a speed not exceeding 100 feet per minute. Here we have increased the ratio of load carrying capacity from 1 to 20 and our speed from 1 to 5. As to the importance in value of skid operation it is interesting to read from the report of Ray Hudson, assistant director of the bureau of standards, United States government, who says the following with respect to the elimination of waste:

> "Among other items selected for particular attention in this highly scientific division of the government is the saving of expense in handling goods by using skid platforms and lift trucks."

Mr. Hudson states that 100,000 hand lift trucks and 8000 power lift trucks are now in service throughout the United States, representing an investment of approximately $75,000,000, and present annual production of $16,000,000. No estimate has been given of the number or cost of skid platforms, as many individual concerns manufacture them locally to meet their own requirements. The cost of the manufactured skid, however, varies from $4 to $30 each, based upon construction.

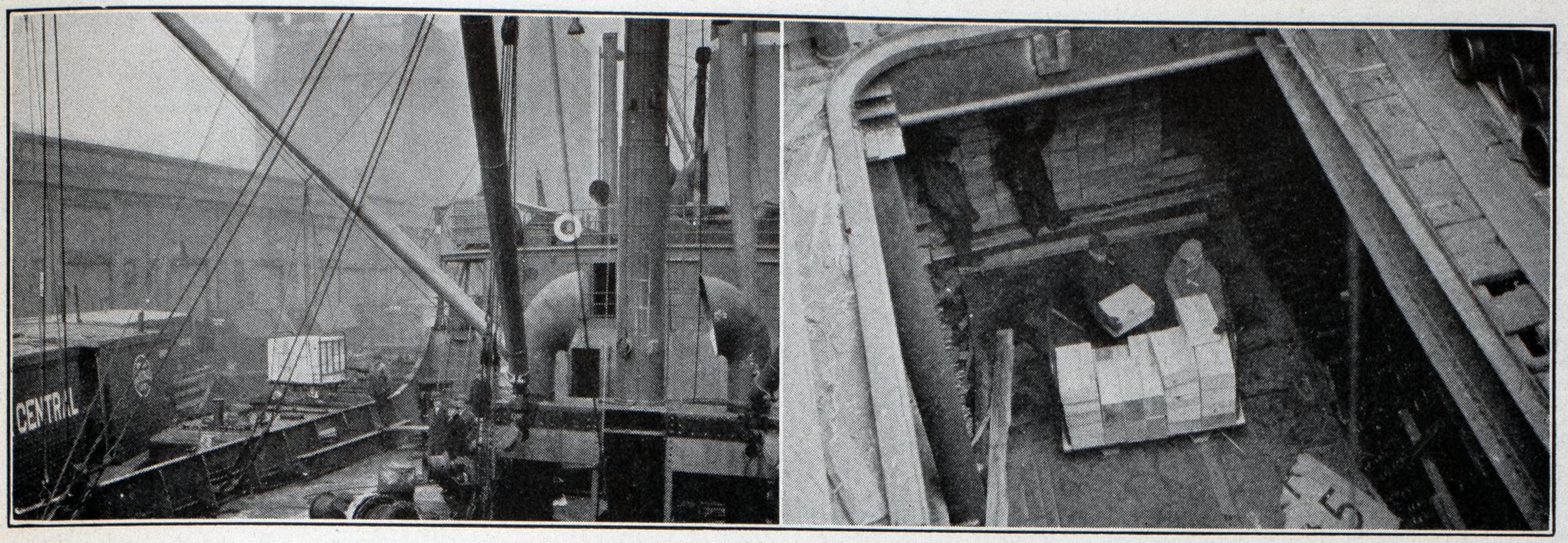
Widespread Use in Industry

The present use of skid operation is confined principally to individual plant or interplant movement and it remained for the New York Central railroad to take the first drastic step in changing the time-honored and accepted method of pier operation in the Port of New York by the institution of skid platform and lift truck operation on Pier 3, at Weehawken, N. J., at which point there is now in active daily use 2198 live and dead skids, 15 electric power lift trucks, and several hand lift trucks, the latter being used in certain phases of the operation not considered economical to handle by power driven lift trucks.

The New York Central railroad also instituted the first delivery of freight by skids direct from car door to steamer's stowage in the Port of New York. This movement took place on Dec. 31, 1928 at which time a carload of canned goods was so handled



LEFT—SKID READY TO BE HOISTED FROM LIGHTER. RIGHT—HANDLING SKIDS ON LIGHTER



LEFT—SLINGING SKID OVERSIDE. RIGHT—UNLOADING SKID IN HOLD OF STEAMER

to Pier 9, East river, for West Coast movement in steamship MYSTIC of the Munson-McCormick line. The shipment consisted of 730 boxes of canned goods and required the use of 16 skids, the majority of which carried 45 cases each.

The delivery from car door to ship's stowage having proven practical, a second shipment was made on Jan. 14, 1929 of seven carloads of freight, consisting of wall paper, toilet paper, caustic soda, and roofing slate. This delivery was made to the steamship CHARLES R. MCCORMICK of the Munson-McCormick line, for movement to West Coast points.

It was particularly interesting to note the condition of the freight as it was being stowed into the steamer, as there had been some discussion as to the feasibility of skid operation to steamers not equipped with side ports. Many coastwise steamers operating in the port use skids locally on their own piers, loading direct from pier floor through side port into ship's stowage. The wall paper moved over the side in skidloads of 50 bundles each, the toilet paper in loads of 16 cartons, caustic soda 6 drums per skid, and slate skidloads weighing up to 4000 pounds each.

Saves Loss and Breakage

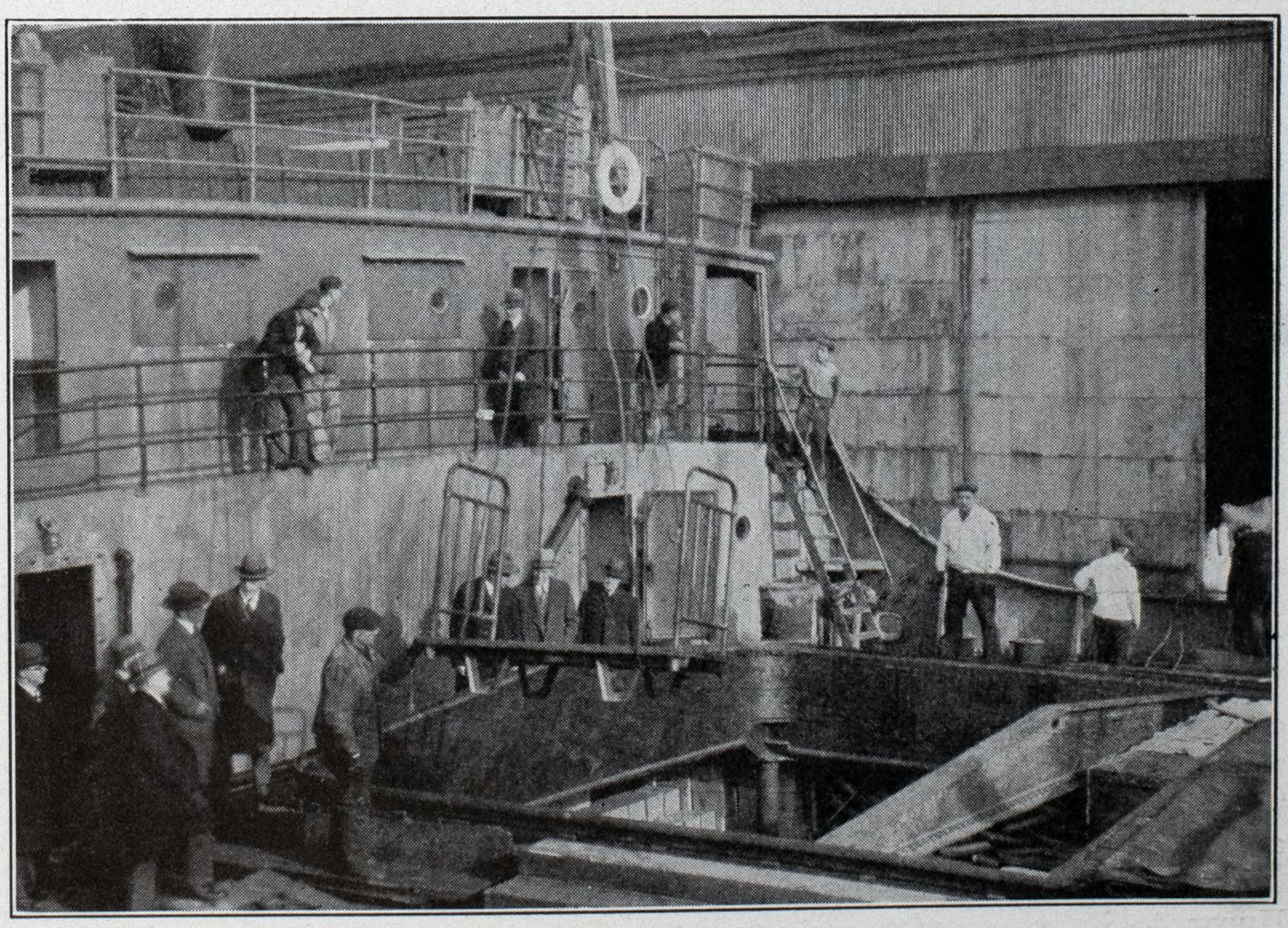
The loading of these various commodities from car to steamer direct on skids not only saved two or more handlings of the commodity at the railroad terminal but saved the rehandling by stevedores at ship's side of the individual packages or pieces, and by this method of stowing speeded up the operation at steamer's side, affording quicker loading and earlier release of ship. Upon completion of this delivery there were no broken pieces of slate lying on the floor of the barge or in the hold of the ship, showing conclusively the benefit of this method of shipping of commodities of this class. The representatives of the New York Central railroad and the Munson-McCormick line, having safely and successfully handled shipments on skids from car door to ship's stowage, decided to extend the method. It was agreed that the New York Central railroad should furnish a sufficient number of skids to take at least one carload of canned goods from car door in New York to consignee at Los Angeles delivered on original skid platforms.

On Jan. 26, 1929 the New York Central railroad again moved a shipment of seven carloads to the steamship SIDNEY M. HAUPTMAN, of the Munson-McCormick line, for West Coast movement, varying the commodity to broaden experience in this so-called new method of transportation. By a little forethought and intensive study it was possible at this time to load 78 cases of canned goods per skid and noticeably increased skidloads of other commodities. The shipment handled to the Pacific Coast on skids consisted of 911 cases loaded on 12 skids, 11 of which contained 78 cases each and the twelfth the remaining 53 cases. Although the design of skid used in this experiment was not the best for steamship stowage owing to its 12-inch clearance, the reduction in expense due to less handling at steamer's side, and the reduction of loss and damage claims, more than offset the lost space.

Used in Through Shipments

The New York Central railroad is also handling the westbound movement of refined sugar on skids direct from refinery at Edgewater to its terminal at Weehawken, N. J. Skid movement in this instance enables a later shipment of the sugar from the refinery and insures a westbound movement on fast freights leaving the terminal the same night. Here too is reflected a reduction in handling costs and an assurance of the commodity being placed in the cars in

(*Continued on Page* 102)



RETURNING EMPTY SKID TO LIGHTER

Up and Down the Great Lakes

Mississippi Barge Canal—Lake Levels—Heavy Ice—Launch Self Unloader—New Engine To Be Tried Out on Freighter

ABANDONING hope for federal aid for the Illinois waterway, the Chicago association of commerce has asked for state action for the early completion of the lakes-to-the-Mississippi barge canal.

The association has asked the Illinois legislature to appropriate from the general funds sufficient money to finish the work in whole or in part, as far as it may legally do so. For the excess cost above the limits set by popular vote, the legislature is asked to pass a joint resolution calling for a referendum vote at the general election next November to authorize the issuance of bonds.

The stand of the association follows a report of its committee on harbors and waterways which holds that such legislative and referendum action is the only likely way of relieving the $3,000,000 to $4,000,000 deficiency now threatening completion of the waterway.

Plan New Shipyard

Reports from Superior, Wis., indicate that a new shipyard to be erected on the site of the old Globe Shipbuilding Co. in St. Louis Bay is being contemplated. Capt. C. A. Massey who was associated with the Globe Shipbuilding Co., is said to be promoting the new enterprise.

Heavy Ice Conditions

Ice conditions on the Great Lakes were reported on March 15 by Norman B. Conger of the Detroit weather bureau as follows: For Lake Superior, Duluth-Superior harbor ice was 30 to 31 inches thick while the field for ten miles out was 19 inches thick. At Sault Ste. Marie it was 23 inches thick and St. Mary's river solid.

On Lake Michigan the ice at Escanaba was 20 inches thick; Green Bay showed 12 inches, Sturgeon Bay 12 and Mackinac 21.

For Lake Huron, the eastern end of the straits was reported still firm, with Saginaw bay still solid. Ice was reported running out of the river at Bay City.

Lake Erie was reported open from Huron to Fairport, with ice jammed about the islands where it was blown from the west end of the lake. The ice was reported as being badly windrowed at Buffalo.

On Lake Ontario no ice was reported except at the extreme eastern end. At Ogdensburg it was said to be melting very rapidly.

February Lake Levels

The United States Lake Survey reported the monthly mean stages of the Great Lakes for the month of February as follows:

Lakes	Feet Above Mean Sea Level
Superior	602.46
Michigan-Huron	580.56
St. Clair	575.76
Erie	572.09
Ontario	245.93

Lake Superior was 0.15-foot lower than in January, and it was 0.60-foot higher than the February stage of a year ago. Lakes Michigan-Huron were 0.01-foot lower than in January and they were 1.74 feet higher than the February stage of a year ago, 1.57 feet above the average stage of February of the last ten years. Lake Erie was 0.26-foot higher than in January and it was 0.36-foot higher than the February stage of a year ago. Lake Ontario was 0.08-foot higher than in January and it was 0.06-foot lower than the February stage of a year ago, 0.91-foot above the average stage of February of the last ten years.

Launch Self-Unloader

The steamship FERNIE, the new freighter for the Canada Steamship lines, was launched recently at the yards of the Midland Shipbuilding Co., Midland, Ont. Similar to the steamer LETHBRIDGE launched in 1923, the new vessel has a length of 250 feet, a beam of 42 feet 9 inches and a depth of 26 feet 6 inches. Her gross tonnage is given as 2380 tons. Her speed is to be about 12 miles per hour loaded. Loading and unloading equipment is of the most modern type.

Completion of this vessel clears the way for the beginning of construction of the new 600-foot freighter to be constructed at the Midland yards for the Canada Steamship Lines. The 600-footer is to be of the same type as the GLENEAGLES.

Try Out New Engine

What is said to be the first innovation in steam engines on the Great Lakes in 30 years is to be given a test this season in the steamer M. E. FARR of the Tomlinson fleet. The vessel operates in the grain and ore trade.

The American Shipbuilding Co. began recently to install a 2600-horsepower Prosser type three-cylinder engine in the vessel. The engine was built in Lorain and her castings made in Cleveland. Complete steam-jacketing of cylinders to reduce condensation is the basis of the Prosser idea. Quite a great deal of success has been enjoyed by the Prosser engine for stationary work since it was patented by Joseph G. Prosser in Chicago. J. C. Workman, chief engineer of the American Ship Building Co., has worked out the first marine installation of it.

It is claimed that the new engine will reduce hourly coal costs from $7.50 to $5.95 a ton. If the installation proves successful it will bring steam engines closer to an economy comparison with diesel engines. According to I. H. Ness, assistant chief engineer of the Winton Engine Co., the fuel cost of operating a diesel for the same work would amount to $4.55.

Mr. Workman said that the new engine will be watched closely by the makers of the Bauer-Wach and Lentz abroad since they are regarded as competitors of the Prosser.

To Open Season

According to E. R. McCracken, general passenger agent of the Detroit & Cleveland Navigation Co., the company is planning to resume service about March 26 if Lake Erie ice conditions permit. Lighthouses will be in operation and all aids to navigation will be in place. The vessels CITY OF DETROIT III and CITY OF CLEVELAND III are to be operated in the service. Daylight steamers are to be run by the company every day except Sunday in addition to the regular overnight service.

Move To Aid Cargo Ships in Next Congress

Inasmuch as no benefits are given cargo vessels by the Jones-White bill, a special committee of government and private shipping experts is making a study of plans to aid freight ships with a view of submitting recommendations to the shipping board whence the bills will pass on to congress for consideration. The purpose of this study is to bring about some form of assistance to cargo vessels which will permit their construction in America and equalize if possible the great differences in construction costs here and abroad.

While the Jones-White bill provides aid for established passenger and cargo lines it does not extend any assistance to cargo vessels engaged in irregular services. A very definite need is felt by Mr. Walker for some form of aid for all types of vessels in order to build up an adequate American merchant marine.

This move to formulate some plan for rendering assistance to all types of cargo vessels so that they could be constructed in American yards came out of the second national conference of the merchant marine held recently in Washington. Speaking before the convention, Representative Wallace M. White of Maine asserted that the bill of which he was the co-author did not go far enough and urged that the government refund to American shipping companies building vessels in American yards, the difference between the cost of the construction of the vessels in this country and abroad. Such assistance is said by Representative White to be absolutely essential if American lines are to compete with foreign cargo lines.

Approve Load-Line Bill as Safety Measure

The conference report on the load-line bill which was accepted by the house of representatives on Feb. 28 was agreed to by the Senate on March 1. Senator Jones of Washington, chairman of the senate commerce commission, stated that the load-line act as finally approved "applies only to vessels engaged in foreign trade.

The measure directly affects merchant vessels of 250 gross tons or over, loading at or proceeding to sea from any port or place within the United States or any of its possessions for a foreign voyage by sea, and vessels of the same class loading at or proceeding to sea from any foreign port or place for a voyage to United States ports or any ports belonging to possessions of the United States.

Harbor Facilities Help Rhine Traffic

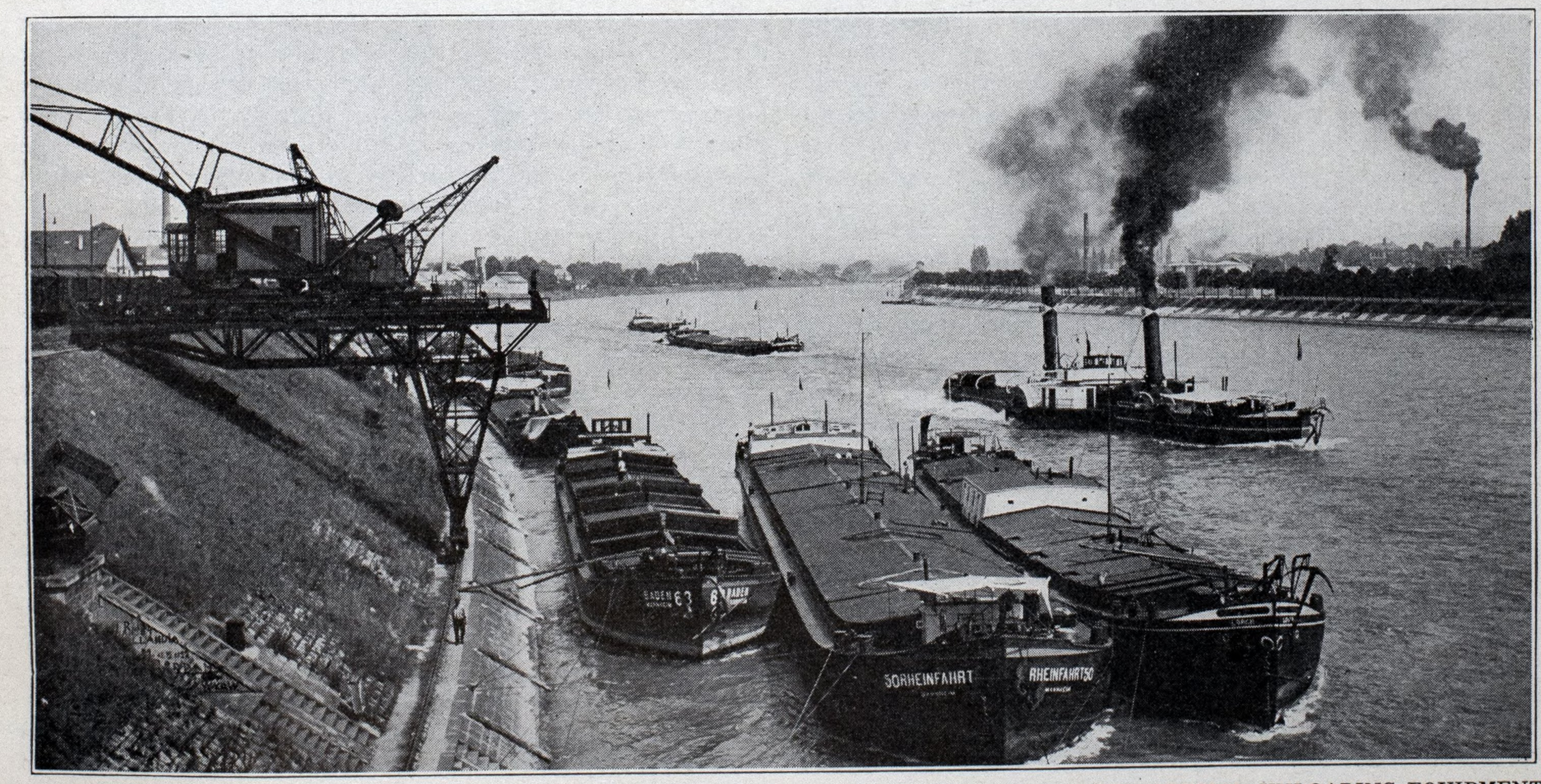
OWING to its advantageous location, Basle, a city of some 150,000 inhabitants, is already a railroad center and aerial port of international importance. Now another of its ambitions has been realized, for it actually has become an inland port of noteworthy size, and the old joke about Switzerland's navy would thus no longer be quite accurate.

Trial trips on the Rhine between 1904-1906 showed that this river could be made navigable for commercial purposes. Work on the building of the so-called St. Johann port was promptly started by the city of Basle in 1906. A quay, 1968 feet long, was constructed and duly equipped with all necessary modern machinery on the left river bank, adjoining the Alsatian frontier. The port serves commercial enterprises and railroad transportation to and from station Basle St. Johann is effected by the Swiss Federal railroads.

In 1919 Basle proceeded to the construction of the spacious Kleinhuningen port on the right river bank, adjoining German territory. This harbor was completed in 1922. With its huge cranes, storage houses, silos, etc., it affords a most impressive sight. Its special railroad station is also operated by the Swiss Federal railroads.

Big commercial transports on the Rhine between Strasbourg and Basle are, until the river is duly regulated, more or less dependent on weather conditions. At present, when the river is low, commercial traffic has to be temporarily suspended. However, since the French canal authorities made the section Huningen-Basle navigable in 1925, Basle is privileged to avail itself of the extensive French and Belgian system of canals when the Rhine is too low. It is interesting to note

(*Continued on Page* 100)



ST. JOHANN HARBOR, BASLE, SWITZERLAND—DEVELOPING INTO A LEADING INLAND PORT—SPECIAL UNLOADING EQUIPMENT

Personal Sketches of Marine Men

Charles F. Bailey, Engineering Director, Newport News Shipbuilding & Dry Dock Co.

By H. R. Simonds

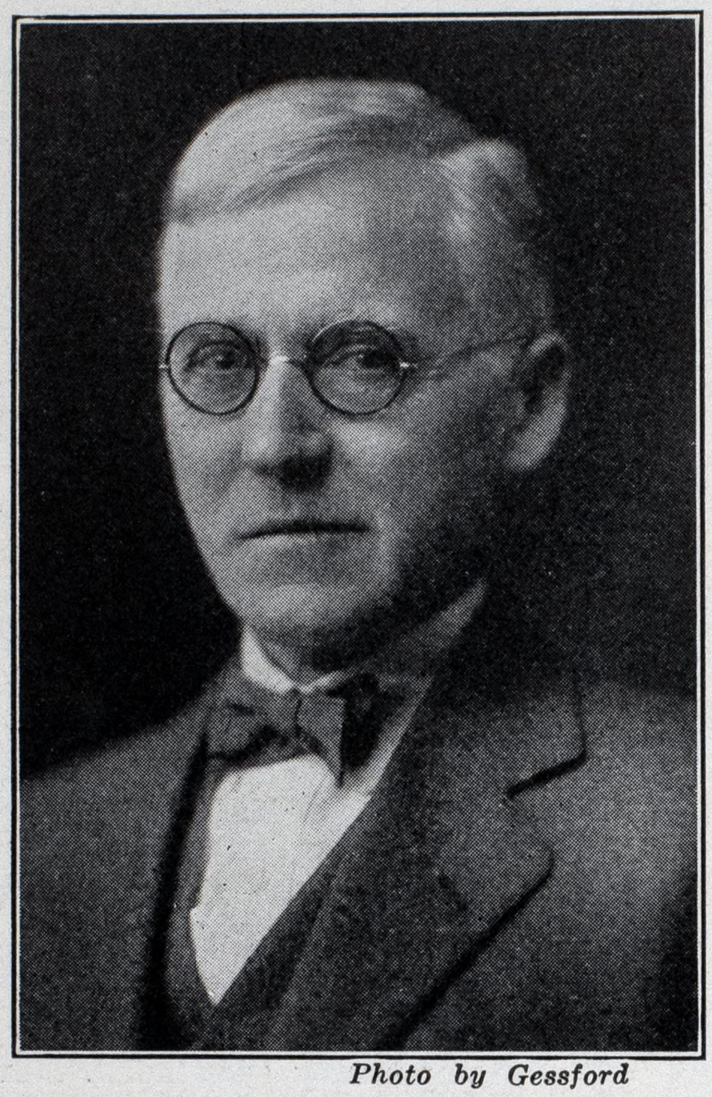


Photo by Gessford

IN RECOGNITION of his long and distinguished service and many notable achievements in the field of marine engineering, Worcester Polytechnic Institute recently conferred upon him an honorary degree.

DURING nearly 40 years of service in marine engineering he has taken an effective part to bring about the present remarkable developments in the use of turbines and higher steam pressures.

HE HAS always shown an intense human interest in his associates and assistants and he has been instrumental in developing a large number of capable marine engineers in the shipbuilding field.

NOTICES of the completion of the largest American built vessels, the CALIFORNIA and the VIRGINIA carried the brief statement that Charles F. Bailey was the engineering director of the company which built them, the Newport News Shipbuilding & Dry Dock Co. Little was said in these articles of the important part played by the engineering director in the design and execution of these revolutionary vessels. Mr. Bailey is a modest man and his chief concern seems to be to have his associates receive due credit for their work. However, his position as a leader in marine engineering activities has been recognized by his alma mater the Worcester Polytechnic institute, Worcester, Mass., which recently conferred an honorary degree upon him.

Charles F. Bailey was born in the little town of Greensboro, Vt., in 1863. He went through high school in his native state and was then sent away from home for four years of college training. He early displayed an inclination for mechanical things and before finishing high school had decided to become an engineer. Accordingly Worcester Polytechnic institute was selected, and he was graduated from there in 1888 with a degree of bachelor of science in mechanical engineering.

Heeding Horace Greeley's famous advice to young men, he started out for the far West to seek his fortune immediately after leaving school. He landed in Tacoma, Wash., and after some anxious days without a job was taken on by the Northern Pacific railway as a machinist. He worked a year at this job and received a lot of good practical working knowledge which was to become valuable in later years. In 1889 he left to become a draftsman of the Tacoma Foundry & Machine Co., Tacoma, and a year later returned East. It is probable that a Miss Almeri Adgate of East Hardwick, Vt., had something to do with his return, for in 1891 she became Mrs. Bailey, and that same year Mr. Bailey was appointed chief draftsman of the Neafie & Levy Ship & Engine Building Co. in Philadelphia. It was at this time that Mr. Bailey first turned his attention to the sea. Accident probably determined his first association with the Neafie & Levy Ship & Engine Building Co., but there must have been some strain of the seafaring folks of New England in his blood for he immediately threw himself wholeheartedly into the work of designing and building vessels.

He joined the force of the Newport News Shipbuilding & Dry Dock Co., in 1891, and in 1900 was appointed chief engineer, a position held for 15 years during which he made valuable contributions not only to the Newport News Shipbuilding & Dry Dock Co., but to the profession of marine engineering as a whole. In 1915 he accepted an appointment as consulting engineer for the Westinghouse Electric & Mfg. Co., East Pittsburgh. His work with this company continued to be in the marine field, but his services were missed at Newport News, and three years later he was offered a position on the board of directors of the Newport News Shipbuilding & Dry Dock Co., and the title of engineering director. This he accepted and he has remained in that capacity ever since.

He is also director of the Newport News Construction Corp., and the Newport News Land Corp., and has many

interests of civic and marine nature. He is a member and past vice president of the Society of Naval Architects and Marine Engineers. He is on the technical committee of the American Bureau of Shipping and on the central committee on standardization of the American Marine association. He is a civil member of the American Society of Naval Engineers, and is a member of the Engineers club of New York and of several other clubs.

One of his outstanding traits and a quality which has played an important part in his success in life is an intense interest in his fellow workers. He is a strong advocate of the value of apprentice courses in industry, and has been active in organizing and carrying on the apprentice school at the Newport News shipyards. H. L. Ferguson, president of the company recently said that Mr. Bailey had developed more capable marine engineers than any one connected with the marine engineering industry. He is a quiet unassuming man of modest tastes and few hobbies. His recreation is found in outdoor life and in welfare work for young men in industry.

Port of Houston Shows Rapid Growth

HOUSTON'S most valuable asset has been, and is, her waterway. In the early days it was her only medium of communication with the outside world. Since the completion of vast improvements in the transportational facilities of this waterway, Houston has been enabled to establish herself as one of the great ports of the nation.

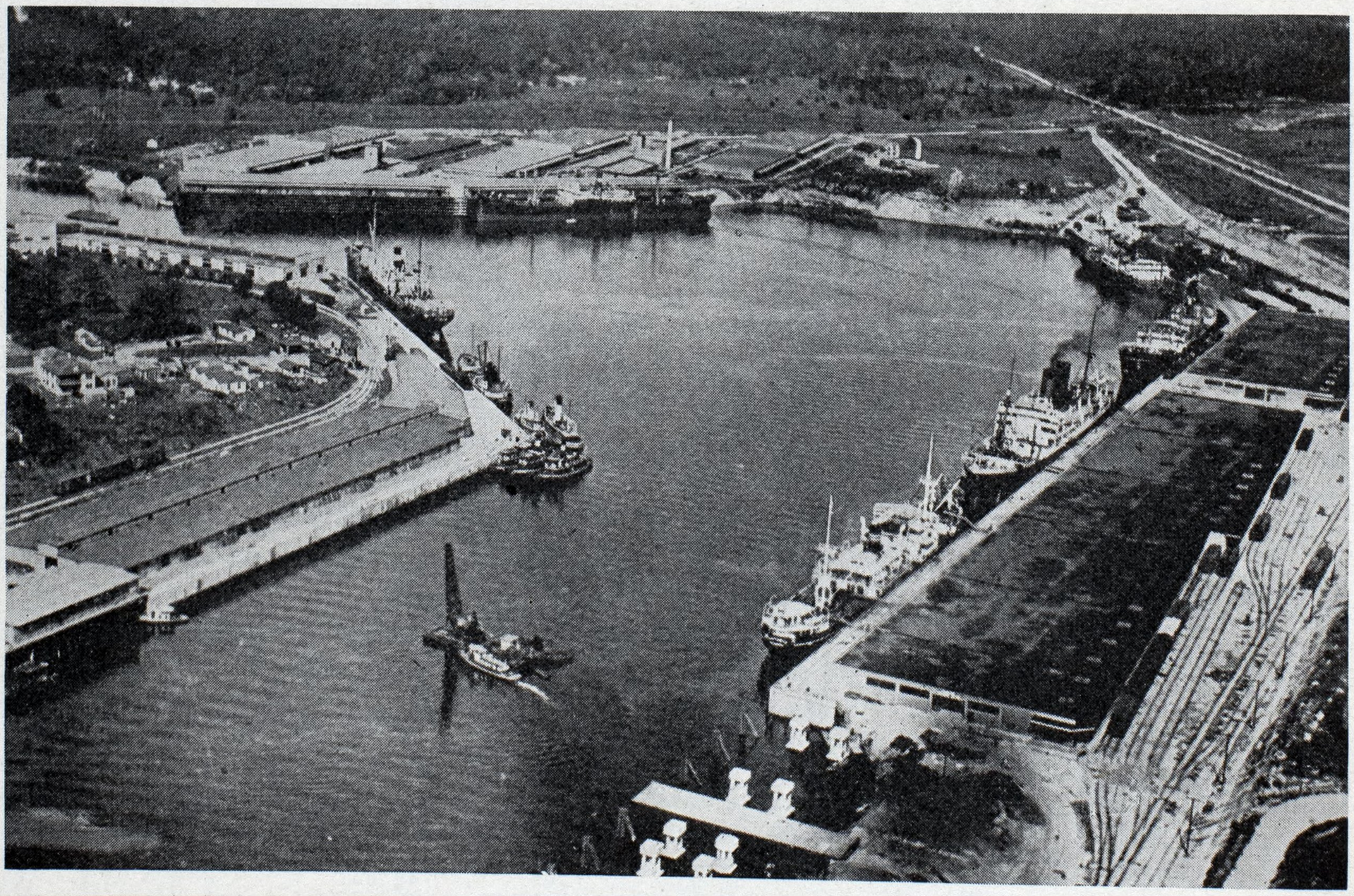
The first real attempt to navigate Buffalo bayou direct from the Gulf of Mexico was in October, 1866, when the Houston Direct Navigation Co. was granted a charter, the incorporators being Houston business men. By act of congress, July 14, 1870, Houston was made a "port of delivery."

Since that time approximately $20,000,000 have been spent by the Federal government and the citizens of Harris county for improvement work in connection with the creation of a port. Of this amount citizens of the city and county expended $7,700,000 for harbor facilities.

The development of the port has been just as remarkable from the viewpoint of results obtained, as it has been romantic from the standpoint of human achievement. In 1920, which was the first full year of exportation (the first ship to sail from the Port of Houston carrying an export cargo being in November, 1919), the total tonnage was 1,210,204. For the year 1928 the total was increased to 12,979,826 tons, and a gain of 900 per cent. Houston now ranks fourth of all ports of the United States in point of tonnage. The valuation of the city's 1928 port business was $598,724,008.

In November, 1919, Houston exported her first bale of cotton and the total exportation of that commodity for the 1919-20 cotton season was 69,839 bales. In the short space of five years since that time the port has reached the rank of second cotton port of America. At the close of 1927-28 season, the 12-month record had reached 1,968,969 bales.

The illustration below shows the turning basin at the Houston, Tex., ship channel. By deepening and widening an old river bed which extends from the city limits of Houston to the Gulf of Mexico, a deep water port of exceptional efficiency has been created for ocean shipping to serve this important section.



Turning Basin—Houston, Texas—Remarkable Protected Ocean Harbor—Sound Port Development

American Shipbuilding

(*Continued from Page* 19)

country, it seems only fair that the government should through proper legislation give to the shipyards the same protection given to other industries. The shipbuilders through their organization, the National Council of American shipbuilders, have given this matter much study. Facts and figures are available on which effective legislation could be drafted.

As in previous years, even though the roll of new American ships is not impressive, it is worth while to study the characteristics of the vessels built and to give facts concerning the type of machinery and equipment used. To do this 92 steel merchant type powered vessels over 10C gross tons, under construction in some stage or contracted for during the year 1928, have been listed on pages 70-71. From the vessels so listed a total of 24 have been chosen as distinctive and as representative. Through duplication the vessels so featured actually represent 34 all told. Pages 20 to 58 are used to illustrate and to give information in detail for each vessel so selected, one to a page. History is repeating itself in that no vessel in this list was constructed exclusively for the foreign trade and strictly speaking only six are suitable for overseas service. However, one of these, the turbine electric liner VIRGINIA is the largest American passenger vessel ever built and though she is operating in the inter-coastal run, her size, machinery, equipment and general arrangement make her suitable for practically any overseas service.

The table on page 19 gives an analysis by actual count of the types and machinery of the 92 vessels listed. It is interesting to note the relative demands of different classes of service. Though there is every evidence that definite progress is being made in the application of modern machinery the reciprocating engine is still an important factor as 26 of these vessels are fitted with this type of power. The diesel and diesel electric drive is steadily increasing but it must be remembered that the increase in number of such installations does not mean the same proportionate share of the total horsepower involved. In other words though there are a number of larger vessels, such as ocean going tankers, fitted with the diesel engine, by far the larger number are smaller vessels for harbors, rivers and bays.

The most important development in type of motive power is the marked increase in so short a period of time of the turbine electric drive. No less than eleven vessels, four of them passenger ocean going ships and the other seven all of considerable size were fitted with this type of drive.

In the analysis of motive power shown on page 18 in tabulated form, it is interesting to note the decline in the use of the steam reciprocating engine. In 1926 this type of power accounted for 41.3 per cent of the total number of vessels listed; in 1927, 40 per cent were so equipped and in 1928 only 28.2 per cent were fitted with the reciprocating steam engine with coal and oil as fuel. Diesel as primary power increased from 42.8 per cent in 1927 to 54.4 per cent in 1928. Electric power at the propeller has shown a steady increase, from 24.8 in 1926 to 26.7 per cent in 1927 and to 32.6 per cent in 1928.

Hold Safety Conference

(*Continued from Page* 79)

Arthur J. Tyrer, commissioner of navigation, department of commerce; D. N. Hoover, supervising inspector general, steamboat inspection service, department of commerce; W. D. Terrell, chief of radio division, department of commerce; Rear admiral J. G. Tawresey, construction corps., United States navy (Ret.), United States shipping board; H. B. Walker, president, American Steamship Owners' association, New York; H. G. Smith, vice-president, National Council of American Shipbuilders, New York; Captain C. A. McAllister, president, American bureau of shipping.

The delegation will be assisted by the following technical experts:

Lieutenant Commander E. L. Cochrane, CC., U.S.N.; J. C. Niedermair, navy department; J. F. Macmillan, American Steamship Owners' association, New York; David Arnott, American bureau of shipping, New York; Captain W. E. Griffith, United States shipping board, New York; A. J. Smith, marine office of America, New York; Captain N. B. Nelson, steamboat inspection service, Cleveland, O.; Lieutenant E. M. Webster, U. S. coast guard; William Gatewood, Newport News Shipbuilding and Drydock company; Commander C. M. Austin, U. S. N.; navy department; E. B. Calvert, weather bureau, department of agriculture.

The second national conference on oil and gas power will be held at State College, Pa., June 24 to 27 under the auspices of the American Society of Mechanical Engineers.

South American Line

(*Continued from Page* 81)

Buenos Aires May 28. The second sailing from this port will be made by the EASTERN PRINCE on June 8 and these two vessels will maintain monthly sailings until the SOUTHERN PRINCE enters the run on Aug. 31. Thereafter a regular fortnightly service will be maintained. The fourth and last liner in the building program, the WESTERN PRINCE, will make her first sailing from New York on Sept. 28. The New York terminal will be Pier 74 North river, foot of West Thirty-fourth street.

All of the company's 35 years experience in South America and other trades have gone into the construction of the "four princes" and they combine the utmost in comfort, luxury and speed. Every element of safety developed by thoroughly demonstrated scientific methods approved by the rigorous shipping laws of the United States and Great Britain is embodied in the construction of these vessels. They have, in addition, watertight bulkheads in excess of the requirements of the Internationl convention for the safety of life at sea and are built to the highest requirements of Lloyds. Lifeboats are hung on Welin-Maclachlan davits which insures immediate launching should an emergency ever arise.

Excellent passenger accommodations are provided for about 100 first class passengers on each of the vessels. These accommodations are mostly in outside staterooms with private baths. Large roomy cabins with twin beds, 10 by 12 feet are provided and the furnishings and decorations are of the finest. In each room is a punkah louvre ventilating fan device, and steam heat equipment, controllable by the occupant. Thus the passenger whether traveling in warm or cold latitudes is able to maintain an even temperature in the cabins at all times.

There are six cabins de luxe on the sun deck at the entrance hall. These each have a private bath and trunkroom. Their furniture and appointments are more elaborate and they are larger than the other staterooms. The walls are paneled in beautiful woods in various light shades, and taste and refinement are exemplified in every detail of their appointments.

The needs of shippers have also been carefully considered in the construction of the four liners for in addition to generous space being given over to general cargo there are also provisions for carrying perishable and semiperishable products.

Capt. Reginald Fay Dies

Capt. Reginald Fay, marine superintendent of the New York Central railroad and chairman of the board of visitors of the New York State Nautical school, died Mar. 9 at the New York hospital, at the age of 59.

Graduating from the New York State Nautical school in 1886 at the age of 16, his shipping career began in the American clipper ships. Later he served on steam vessels of the Brazilian Steamship Co., Cornwall Steamship Co., Metropolitan Steamship Co. and later on the Pacific Steamship Co.'s route to the Orient.

In 1891 Captain Fay resigned from the merchant service and entered the employ of the New York Central railroad. Resigning this post in 1895, he went with the Pennsylvania railroad, to return later to the New York Central.

Award Bids for Cutters

An announcement received recently from the treasury department states that the bid of the General Engineering & Dry Dock Co., Oakland, Calif., for the construction and equipment of the three coast guard cutters, Nos. 50, 51 and 52 is to be accepted. As stated in the March number of MARINE REVIEW, the bid was $839,500 for each of the vessels.

Ocean Freight Rates

Per 100 Pounds Unless Otherwise Stated

Quotations Corrected to Mar. 18, 1928 on Future Loadings

NOTE: FREIGHT RATES STEADY WITH SLIGHT CHANGE

New York to	Grain	Provisions	Cotton (H. D.)	Flour	General cargo cu. ft.	General cargo 180 lbs.	††Finished steel	REMARKS Freight Offered
Liverpool	1s 9d	$0.65	$0.40	0.20	$0.50	$0.90	$8.00T***	Fair
London	2s 0d	0.65	0.40	0.20	0.50	0.90	8.00T***	Fair
Oslo	$0.14	0.45	0.50	0.30	0.42½	0.85	8.00T	Fair
Copenhagen	0.14	0.45	0.50	0.30	0.45	0.90	8.00T	Quiet
xHamburg	0.08	0.30-35	0.45	0.20	0.50	0.90	10.00T	Fair
Bremen	0.10	0.45	0.45	0.20	0.50	0.90	10.00T	Fair
Rotterdam and Amsterdam	0.10	0.42½	0.45	0.22	0.45	0.80	9.50T	Fair
Antwerp	0.09	....	0.45	0.22	0.45	0.80	9.50T	Fair
Havre	0.15	0.55	0.31	0.30	0.45	0.80	9.00T	Very good
Bordeaux	0.15	0.55	0.31	0.30	0.45	0.80	9.00T	Very good
Barcelona	....	0.50	0.30	10.00 bags	—12.00T—		10.00T	Fair
Lisbon	....	0.65	0.45	8.00T bags	—23.00T—		8.00T	Fair
Marseilles	....	0.65	0.40	7.00 bags	—23.00T—		8.00T	Fair
Genoa	0.16	14.25T	0.50	9.00	—23.00T—		11.50T	Fair
Naples	0.16	14.25T	0.50	9.00	—23.00T—		11.50T	Fair
Constantinople	0.27	20.00T	0.75	0.40½	—24.00T—		11.50T	Good
Alexandria	....	20.00T	0.75	0.40½	—24.00T—		11.50T	Good
Algiers	....	0.75	0.60	8.0T bags	—23.00T—		11.50T	Fair
***Dakar	....	20.40	....	18.60T	—27.60T—		13.80T	Fair
Capetown	....	18.00	....	13.00 per 2240 lbs.	20.00		20.00	Very good
Buenos Aires	....	22.00T	....	....	20.00 to 22.00T†		8.00 to 8.80T	Fair
**Rio de Janeiro	....	22.00T	....	....	20.00 to 22.00T†		7.00 to 7.70T†	Fair
Pernambuco	....	22.00T	....	9.00T	—22.00T—†		9.70T†	Fair
Havana	0.30*	0.50	....	0.30*	0.61	1.33	10.00	Fair
Vera Cruz	0.35	0.40	0.50	0.35	x		0.25 to 0.35	Fair
Valparaiso	....	1.07	....	0.70	....	....	10.00T	Fair
San Francisco	....	0.45 to 0.90	....	0.40 to 1.10	....	....	0.25 to 0.30	Very good
*Sydney	....	20.00	1.25	20.00	17.50 to 25.20		9.00 and 12.00	Poor
Calcutta	....	....	0.60	....	—18.00T—		10.00T	Fair

From North Pacific Ports to	Lumber Per m. t.
San Francisco	$4.25 to 4 50
South California	4.50 to 5.00
Hawaiian Islands	9.00 to 10.00
New Zealand	15.00 to 18.00
Sydney	11.00 to 13.50
Melbourne-Adelaide	12.50 to 14.00
Peru-Chile	11.75 to 14.00
South Africa	17.00 to 20.00
Cuba	14.00 to 15.00
United Kingdom	62s to 65s
Baltimore-Boston range	$12.00 to 14.00
Florida Range	17.00
Buenos Aires	14.00
South America — East Coast	14.00 to 20.00
South America — West Coast	12.00 to 14.00
China	10.00 to 11.00
Japan	10.00 to 10.50
Japan (logs)	12.00 to 14.00

Flour and Wheat

U. K. and Continent (gross tons)	34s to 35s
Oriental Ports (net tons)	$5.00 to 5.50

T—Ton. ‡Per quarter of 480 lbs. †Landed. ††Heavy products limited in length. *Extra charge for wharfage. **Plus $0.50 surcharge on all rates to Rio de Janeiro on account of congestion. ***Plus 15 per cent. xNo general cargo rates to Vera Cruz.

*Flour to Sydney—$22.50. General cargo—$17.50 to $27.50 Finished steel—$9.50 and 12.50.

***Rates, effective at once, to DAKAR, will be based on whether the company makes a contract. Rates without a contract will be about 20 percent higher. With a contract the same rates as last month apply. The figures are the rates which the company will have to pay which does not make a contract with the Daniel Bacon line to use it exclusively.

xHamburg—provisions 30 cents through April and 35 cents for balance of year.

NOTE: Lighterage rates on fuel in New York reduced from 6½ to 5½c per barrel. The coal strike in Britain is now settled and freight rates or bunker prices for coal or pig iron are again quoted.

General cargo rates to Havana change daily and are omitted for the time being.

Rates to Calcutta are subject to change without notice. Cotton goes only to Bombay. Landing charge of $2.00 per freight ton at Valparaiso.

Principal Rates To and From United Kingdom

	s	d
Grain, River Plate to United Kingdom	24	6
Coal, South Wales to Near East	12	4
Coal, United Kingdom to Buenos Aires	12	6
Manganese Ore, Poti to Philadelphia	$3.85	
Pig iron, United Kingdom to New York or Philadelphia	13	0
Iron ore, Bilbao to Cardiff	6	3
Iron ore, Huelva to Phila. or Balto	11	9

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
May 19, 1928	5.00@5.60	1.30	4.92
June 19	5.00@5.60	....	4.92
July 18	5.00@5.60	1.10	4.92
Aug. 18	5.00@5.60	1.10	4.92
Sept. 18	5.65	1.10	4.92
Oct. 18	5.65	1.10	4.92
Nov. 20	5.00@5.65	1.10	4.92
Dec 18	5.00@5.65	1.10	4.92
Jan. 18	5.00@5.65	1.10	4.92
Feb. 18	5.00@5.65	1.10	4.92
March 18, 1929	5.00@5.50	1.10	4.92

At Philadelphia

	Coal trim. in bunk per ton	Fuel oil alongside per barrel	Diesel Eng. oil alongside per gallon
May 18, 1928	5.00@5.60	1.20@1.25	4.87
June 19	5.00@5.60	....	....
July 18	5.00@5.60	1.10	4.88
Aug. 18	5.00@5.60	1.10	4.88
Sept. 18	5.65	1.00	4.88
Oct. 18	5.65	.95@1.00	4.88
Nov. 20	5.65	.95	4.88
Dec. 18	5.00@5.65	1.05	4.88
Jan. 18	5.00@5.65	1.05	4.88
Feb. 18	5.00@5.65	1.05	4.88
March 18, 1929	5.00@5.50	....	4.88

Other Ports

Boston, coal, per ton	$7.01
Boston, oil, f. a. s., per barrel	1.01
Hampton Roads, coal, per ton, f.o.b., piers	$4.40 to 4.50
Oct. 7 — Cardiff, coal, per ton	14s 0d
London, coal, per ton	—s —d
Antwerp, coal, per ton	18s 0d
Antwerp, Fuel oil, per ton	80s0d
Antwerp, Diesel oil, per ton	87s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d



AERIAL VIEW OF KLEINHUNINGEN HARBOR, BASLE, SWITZERLAND

(*Continued from Page* 91)

that due to the development of this 545-mile river course, grain from the United States and Canada is loaded at Rotterdam directly into Swiss barges from large ships bringing the cargoes from overseas. Tugs tow the loaded barges up the Rhine to destination at Basle.

For the present at least Basle is the terminus of regular Rhine navigation, for beyond it the river is not navigable for large boats, tugs or barges. The Swiss Niagara lies at Neuhausen-Schaffhausen, between Basle and Lake Constance. A plan to build locks around the falls may be considered. During the summer months regular passenger traffic is maintained by means of small boats in the environs of Basle and as far as Rheinfelden.

Complete U. S. Lines Sale

THE contract of sale of the United States lines and American Merchant lines to Paul W. Chapman, Chicago for operation by a new company to be known as the United States Lines, Inc., was signed by Chairman T. V. O'Connor of the shipping board, in his capacity as president of the Merchant Fleet Corp., and Mr. Chapman, March 21. Delivery of the vessels will be commenced with transfer of the S. S. LEVIATHAN to her new owner on April 8.

The contract was unanimously approved by the shipping board commissioners, before execution by the Fleet corporation, all of whom voted for acceptance of the Chapman bid for the purchase of the lines and leaseholds.

Purchase price of the two lines is $16,082,000 for the eleven ships, and $218,000 for leaseholds here and abroad. Payment of the latter sum will be in cash, while that for the vessels will be on the basis of 25 per cent of the price of each vessel on its delivery with the balance payable in equal annual installments over a period of 15 years. Unpaid balances will bear interest at 4¼ per cent, payable semiannually. The contract provides guarantees for continued operation.

In the execution of the terms of the contract there will be no interruption of service of either of the lines. The LEVIATHAN, for example, arrives in port on April 5, will be delivered on April 8, and will make her scheduled sailing on April 10. The schedule for transfer of the other vessels, all of which will make their subsequent sailings as advertised, is as follows:

AMERICAN MERCHANT	April 10
AMERICAN TRADER	April 17
AMERICAN SHIPPER	April 24
AMERICAN FARMER	May 1
PRESIDENT HARDING	May 6
AMERICAN BANKER	May 8
PRESIDENT ROOSEVELT	May 13
GEORGE WASHINGTON	May 20
AMERICA	May 27
REPUBLIC	June 6

Must Build New Ships

A very important feature of the contract signed today is the agreement whereby the purchasers obligated themselves to construct within the continental limits of the United States two first class vessels of high speed to be run "opposite" the LEVIATHAN in a fast weekly mail service from New York to English channel ports. These vessels are to be of at least 45,000 tons displacement and will be of sufficient speed to put them in a commanding position in North Atlantic traffic.

Plans and specifications for the new ships are to be submitted for the approval of the shipping board within a year and it is agreed that the vessels shall be ready for operation on or before Feb. 13, 1932. In making this stipulation the board agrees that the purchaser shall have the use of moneys from the construction loan fund up to 75 per cent of the construction cost of the vessels at the low borrowing rates provided by the Jones-White law.

Chairman O'Connor congratulated Mr. Chapman on his new enterprise. "I feel," he said, in commenting on the sale, "that the United States lines and American Merchant lines are in safe hands; that the new owners of these services are able American citizens whose experience in shipping and finance will enable them to meet the many problems to be coped with in this highly competitive trade.

"The United States lines is the pride of the American merchant marine. The American public has demonstrated its confidence in these vessels and I am sure this confidence will continue with the services when they become a private American enterprise.

"Almost nine years ago, the congress of the United States set forth a policy of creating an adequate American merchant marine, 'ultimately to be owned and operated privately by citizens of the United States.' This policy has been promoted with diligence by the shipping board, this sale representing 17 ship lines transferred for guaranteed operation within the past half dozen years in lanes where no American flag ships existed before the war.

"The development stage has been passed in the case of the United States lines and American Merchant lines, with the result that American citizens have become willing to invest more than $16,000,000 in the purchase of the ships and to contemplate the expenditure of many times that amount on the construction of new tonnage.

"The purchasers of these vessels have the wholehearted goodwill of the shipping board and the full confidence of all its members that their enterprise will lead the way to a great American merchant marine."

The shipping board Feb. 28 sold the S. S. WEST HEMBRIE to the Dimon Steamship Corp. for $110,000.

Fast Cargo Interchange

(*Continued from Page* 89)

the condition received from the refinery, one handling being eliminated entirely and the product kept off the pier floor.

Skid operation from car door to ship's stowage in the Port of New York being a new operation warrants a continuation of close study of all its details, not only as to the methods of handling the existing skids and equipment, but intensive study as to design, cost, and maintenance of additional skids. As the individual manufacturer or industrial plant handles commodities of a single class the problem of skid design is simple. Once having determined the actual requirements, the size of package, the dimension and design of skid can be definitely established and used extensively. The railroad's problem, however, is vastly different as commodities of all descriptions are received in packages of all sizes and weights, and here it is a problem of skid design to meet the majority of shipments.

The shipper, the railroad company and the steamship company will all derive benefit, not only in the reduction in the number of handlings of merchandise and goods generally, but in the faster movement of larger units, for eventually freight will be checked by skidload containing a definite number of units rather than individually, and a noticeable reduction in loss and damage claims will naturally follow this method of transportation.

Advantages Are Summarized

In skid operation, as in all other new methods applied to the old and accepted forms, there are and will be many problems confronting those interested in its growth, most important of which are:

1. The standardization of skids, which is now being handled by the department of commerce at Washington.
2. The question of the furnishing or pooling of skids.
3. The method of checking freight on skids.
4. The return of skid to its owner.
5. The maintenance of skids.
6. The equalization of skids and loads where traffic is directional.

There are many other items to be considered and discussed and agreements entered into before skids can be indiscriminately interchanged to the mutual benefit of all concerned.

However, skid operation has been established, proven itself practical, and has sufficient merits to justify its continuance. Therefore, any plan or method of transportation beneficial to shipper, railroads and steamship companies containing all the virtues of skid operation will and must continue, and as it becomes generally used will develop into an accepted method of safe and economical movement of freight.

Is Appointed President

Benjamin C. Smith, for over 20 years chief engineer of the Standard Motor Construction Co. of Jersey City, N. J., has been made president and general manager of the company, taking up the work laid down this past winter by Eugene A. Riotte.

Mr. Riotte, one of the very earliest pioneers in the marine engine business in this country and, with his brother, the late Carl C. Riotte, founder of the Standard Motor Construction Co., has been forced by ill health to retire. He is now in Florida recuperating from a very long illness.

Mr. Smith is developing a complete line of electric starting, light weight, reversible diesel engines for yachts and work boats.

Revolution Indicators

Award for contract for electro chronometric shaft revolution indicators by United States navy was made to George Walker, Boston, for the propeller log system. This system indicates each minute, the exact number of revolutions of each propeller, the exact average number of revolutions of all the propellers. It also indicates instantly when any one propeller changes its direction or revolution. The system also calculates each minute the exact distance the ship travels according to the propeller speed curve of the ship and records continuously the engine miles traveled.

A full installation of the propeller log system is now being installed on the U. S. S. NEVADA and on the U. S. S. OKLAHOMA. These ships are being modernized; the NEVADA at the Norfolk navy yard and the OKLAHOMA at the Philadelphia navy yard.

Cables received from Hamburg, Germany, carried the information that the magnificant, new, nearly completed, North German Lloyd 46,000-ton ocean liner EUROPA was very severely damaged through fire March 26. The big passenger steamer with her sister vessel BREMEN was to enter transatlantic service in July.

Panama Canal Tolls

(*Continued from Page* 76)

freight rates for the saving would merely go into the pockets of steamship owners.

"The canal's greatest single need today is the restoration of the Panama canal rules of measurement which are based on the sound fundamental principle of taxing vessels in accordance with their earning capacity."

It has been said that attainment of a cargo of 24,000,000 tons annually would produce earnings sufficient for covering all expenses of maintenance as well as of interest on the capital, a total expenditure of $366,650,000.

Since Panama canal tolls for the calendar year 1928 amounted to $26,375,962.41 and the cargo passing through the canal during the same period was 29,115,595 tons, certainly the time is now ripe for serious consideration on the part of congress for revising toll rates. The figure of 24,000,000 tons which it is said would, if attained annually, produce earnings sufficient for covering all expenses of maintenance as well as of interest on the capital invested, has been surpassed in all but one of the past six years. It would seem that this would warrant from the standpoint of fairness, the most serious consideration of revision of tolls.

As a solution of the problem of tolls, the principle of railroad fare commutation has been suggested. The plan is that vessels on their first transit of the canal should pay full tolls but for each succeeding transit, there would be a reduction of 5 per cent in the tolls bill until the maximum of 30 per cent should be attained. It has been estimated that this plan would result in savings of about $3,000,000 annually to vessels transiting the canal regularly.

Take as an example the AMERIKALAND, the vessel which holds the record for low cost of tolls per ton of cargo, and assuming that on each transit of the canal she carries the same tonnage, 21,600 tons. On her first transit she would pay the full rate $4678.75. On her second transit, the 5 per cent reduction having been applied her tolls would be reduced $233.93 permitting her to make the second transit for $4444.82. This 5 per cent rate of reduction would continue until the maximum reduction of 30 per cent when she would pay tolls of $3215.12.

Sale of the steamship NEPONSET to the Luckenbach Steamship Co. Inc., for the sum of $120,000 was approved by the shipping board March 12.

Build Railway Dock for Farthest North

At St. Anthony, N. F., one of the northernmost ports of that country, the Crandall Engineering Co., Boston, built, during the past year, a 500-ton railway drydock for the Grenfell association. This is to be used to maintain and repair the association's fleet of supply and relief ships which are sent to outlying hospitals, schools, and relief stations located in various parts of Newfoundland and Labrador.

Construction was started June 15, 1928, and the dock was completed in 91 work days under adverse working conditions. As no dredging equipment was available, the necessary excavation was done with a Sauerman drag line operated from a mast on the shore to a well anchored scow outshore. The under-water track is of the three tier construction resting on spread footings of timber and concrete. The cradle is of wooden construction having a length of 120 feet over the keel blocks and a width of 40 feet over the cross beams. There are 16 bilge blocks operated by hand winches from the docking platform. The cradle is hauled by one wrought iron marine railway chain operated by a Crandall steam driven railway dry dock hoist.

Work has been started on a 500-ton railway drydock of the Crandall type for the Wilmington Boat Works Inc., Wilmington, Calif. This drydock forms a second unit in the yard's repair facilities. A 100-ton yacht railway with a turntable has already been installed.

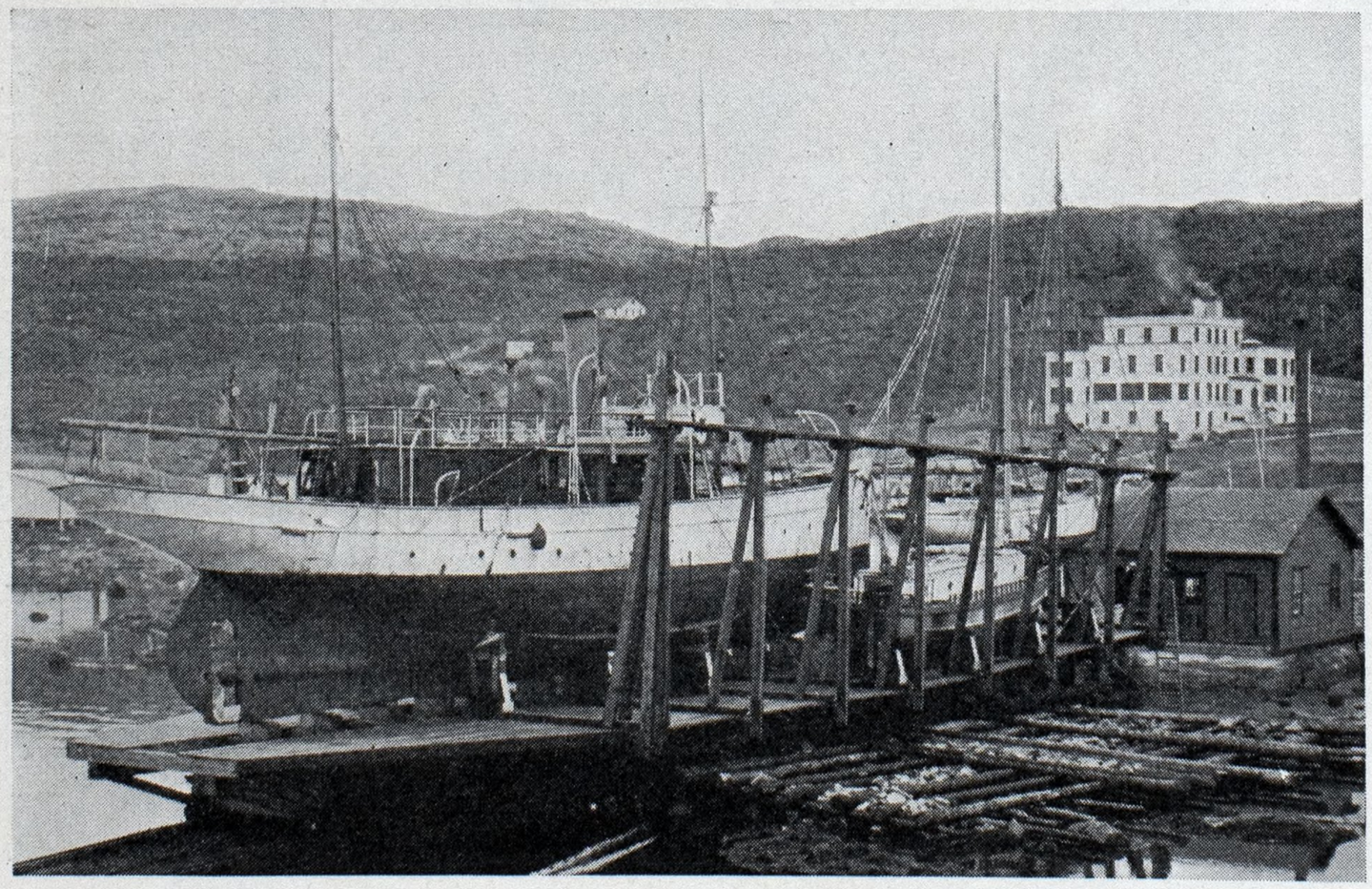
The cradle of the new drydock will have a length of 120 feet over the keel blocks and a clear width of 34 feet and will haul its full-rated load in about 20 minutes from the time the vessel is grounded on the blocks. The Crandall Engineering Co. is the designer and builder.

Seek Bids on Two Lines

On March 1, the United States shipping board began plans for the sale of the American Diamond line and the American France line, which operate vessels in service between North Atlantic and European ports. Accordingly the merchant fleet corporation was instructed by the board to prepare advertisements and specifications for bids, apropos of the sale of the lines. Part of the text of the board's statement follows:

The shipping board has issued instructions to the merchant fleet corporation to prepare advertisements and specifications looking to the sale of the American Diamond line and the American France line for guaranteed operation. The fleet corporation will make its report to the board following which appropriate action will be taken.

The American Diamond line maintains services between United States North Atlantic ports and the European ports of Antwerp and Rotterdam with 14 vessels aggregating 121,737 deadweight tons. The America France line operates between Philadelphia, New York and Baltimore to the French ports of Havre, Dunkirk, Bordeaux and St. Nazaire with 11 vessels aggregating 95,745 tons. This move of the board is in line with its policy to turn over to private interests the operations of shipping lines as rapidly as conditions in private interests warrant it and judging by the number of transfers those conditions are rapidly developing.



500-TON RAILWAY DRYDOCK FOR GRENFELL, ST. ANTHONY, NEWFOUNDLAND

Munson Offers High Bid for River Plate Line

The opening of bids by the shipping board for the Gulf Brazil River Plate line revealed an offer from the Munson SS line of New York to purchase 12 vessels of the line for the sum of $2,695,672, or at the rate of $28 a deadweight ton, the highest price yet offered for any of the government-owned freight lines. In accordance with the specifications for bids, the Munson line offered to maintain regular service of not less than 36 round voyages for a period of five years.

As indicated by its name the line maintains direct freight service from American ports on the Gulf of Mexico to ports of Brazil and the River Plate. The line as presently constituted is a consolidation of two lines formerly known as the American Delta line and the American Dispatch line. It has a total of 13 vessels having an aggregate of 106,047 deadweight tons, and the advertisement for bids invited proposals on at least 12 of these vessels.

The Mississippi Shipping company, which is the present managing operator of the line for shipping board account, offered to buy the 12 vessels for $1,155,288.

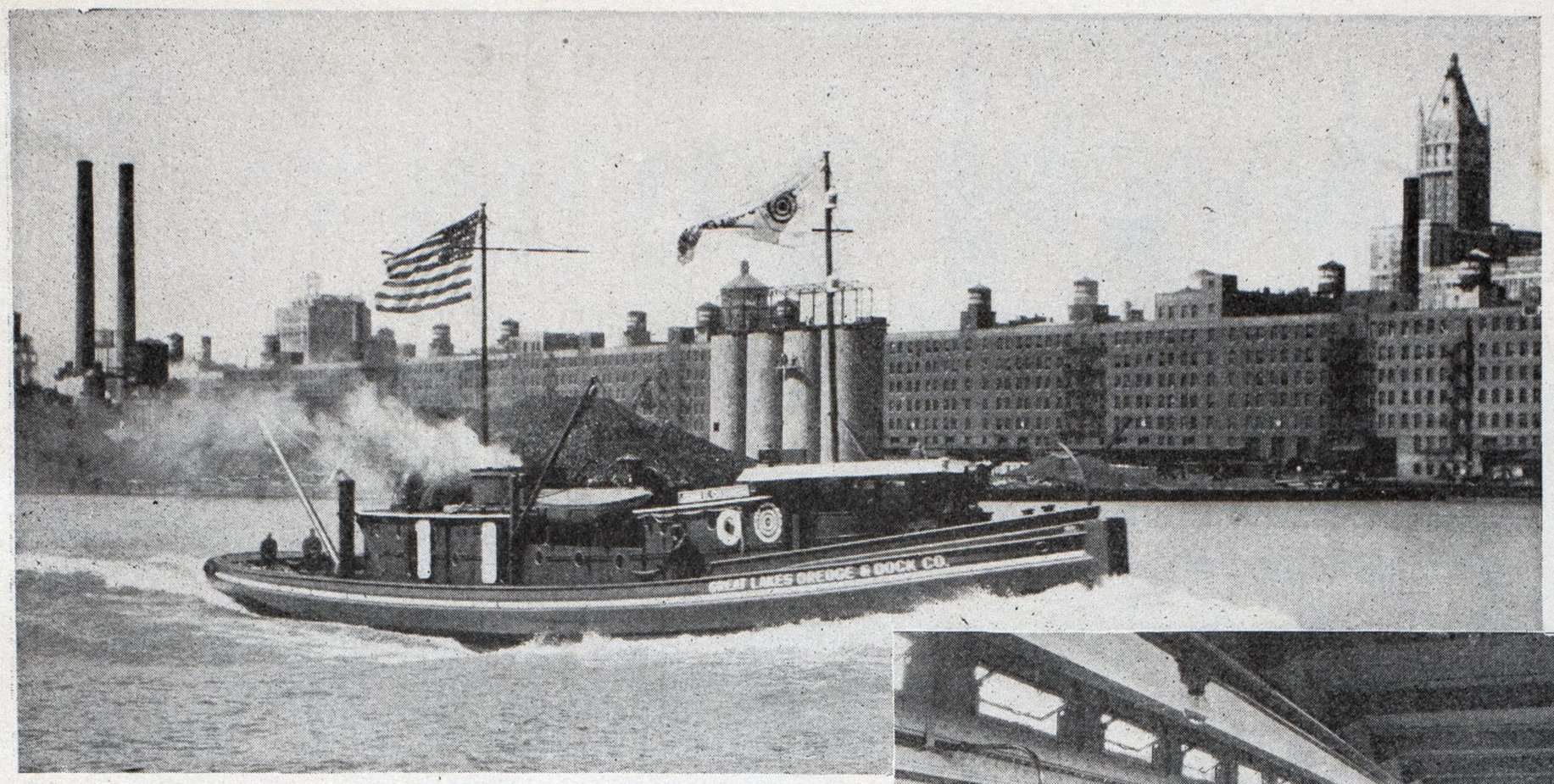
Joseph Silverman Jr., of Washington, bidding on behalf of a new corporation to be formed, offered $1,113,493.50 for all 13 of the fleet.

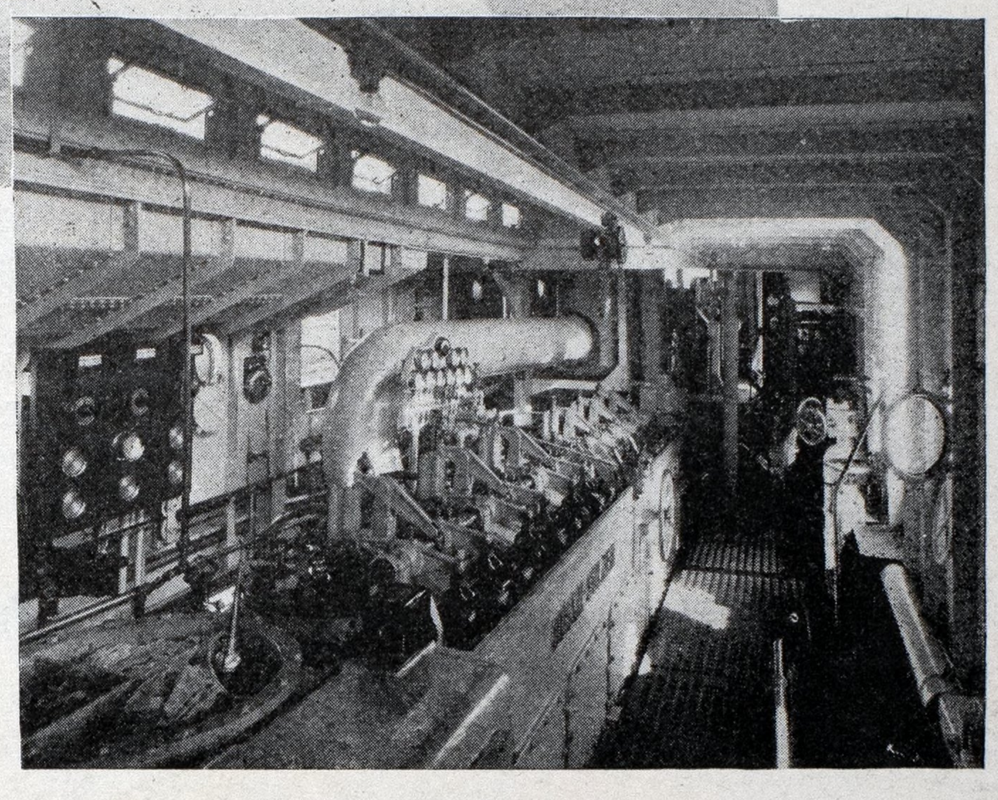
A fourth bid was submitted by Moore & McCormack Co. in the amount of $858,980.70 for the 13 ships. Certified checks amounting to 2½ per cent of each offer were received.

New Day Line Pier

The Hudson River Day line which, for 66 years, has used the Desbrosses street pier as the downtown terminus for its service between New York, Albany and intermediate landings, has been unable to obtain a renewal of its lease and will abandon the operation of its boats to and from that pier with the opening of the summer season on May 18.

The Day line will continue its full summer service from the other two piers of the company at West 42nd street and West 129th street. The tremendous growth of uptown population and the exceptional transportation facilities afforded in the 42nd street section by surface cars, subway and elevated, has convinced A. V. S. Olcott, general manager of the line, that patrons will find the terminus there even more convenient.





Engine Room
Tug — John F. Cushing

Owned by

Great Lakes Dredge & Dock Co.

1,000 S.H.P. — SINGLE SCREW

165 R.P.M. Busch-Sulzer Diesel Reversing Engine

POWERFUL DIESEL TUG

Only 60 gals. Fuel per Hour — Full Load

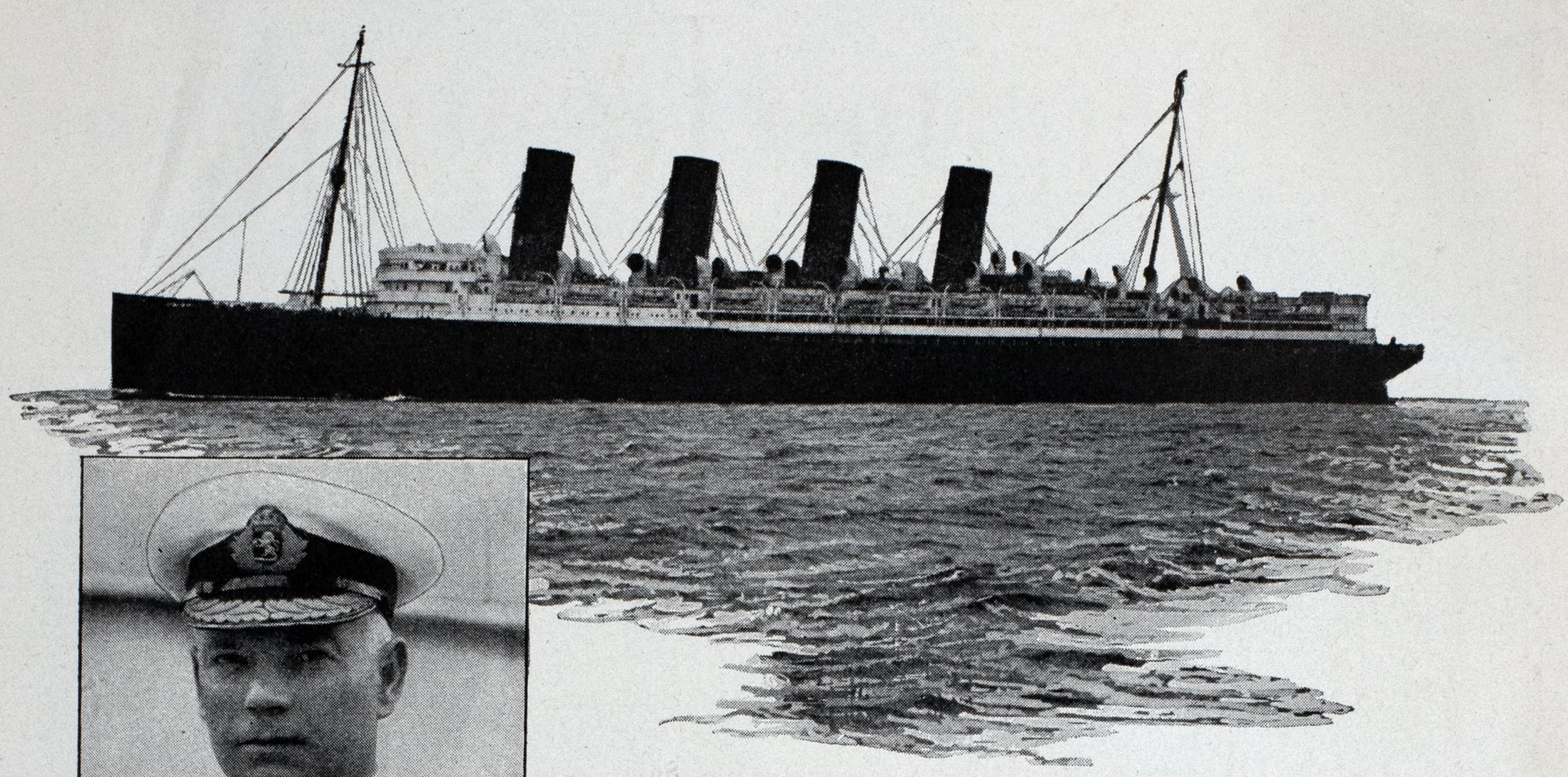
BUSCH-SULZER

BUSCH-SULZER BROS.—DIESEL ENGINE CO.

ST. LOUIS

Two Rector St.
New York

Rialto Bldg.
San Francisco



R. M. S. *Mauretania* of the Cunard Line. During 22 years of record-breaking service her engines have been lubricated with Gargoyle Marine Oils exclusively.



Chief Engineer A. Cockburn

The Mauretania *is still breaking records*

with Gargoyle Marine Oils

Still the greyhound of the Atlantic despite her long service, the Cunard liner *Mauretania* again broke her own transatlantic record last January when she crossed from New York to Plymouth in 4 days, 19 hours, and 55 minutes.

Chief Engineer A. Cockburn may well be proud of the splendid performance of this veteran liner's mighty engines, for which he is responsible. And not without a certain pardonable pride do we point to the fact that throughout the twenty-two years of her record-breaking life the *Mauretania's* engines have been correctly lubricated with Gargoyle Marine Oils.

It is the tangible evidence of performance such as this which leads Chief Engineer Cockburn and hundreds of other marine engineers to rely on the superior qualities of these world-wide lubricants. Experience has taught them that Gargoyle Marine Oils reduce friction to a minimum, lessen the cost of repairs, and prolong the life of propelling machinery.

In more than 300 of the world's leading ports you will find a ready supply of Gargoyle Marine products. The Vacuum Oil Company representative in each of these ports is thoroughly familiar with every type of marine engine. He will welcome an opportunity to help in solving your lubrication problems.

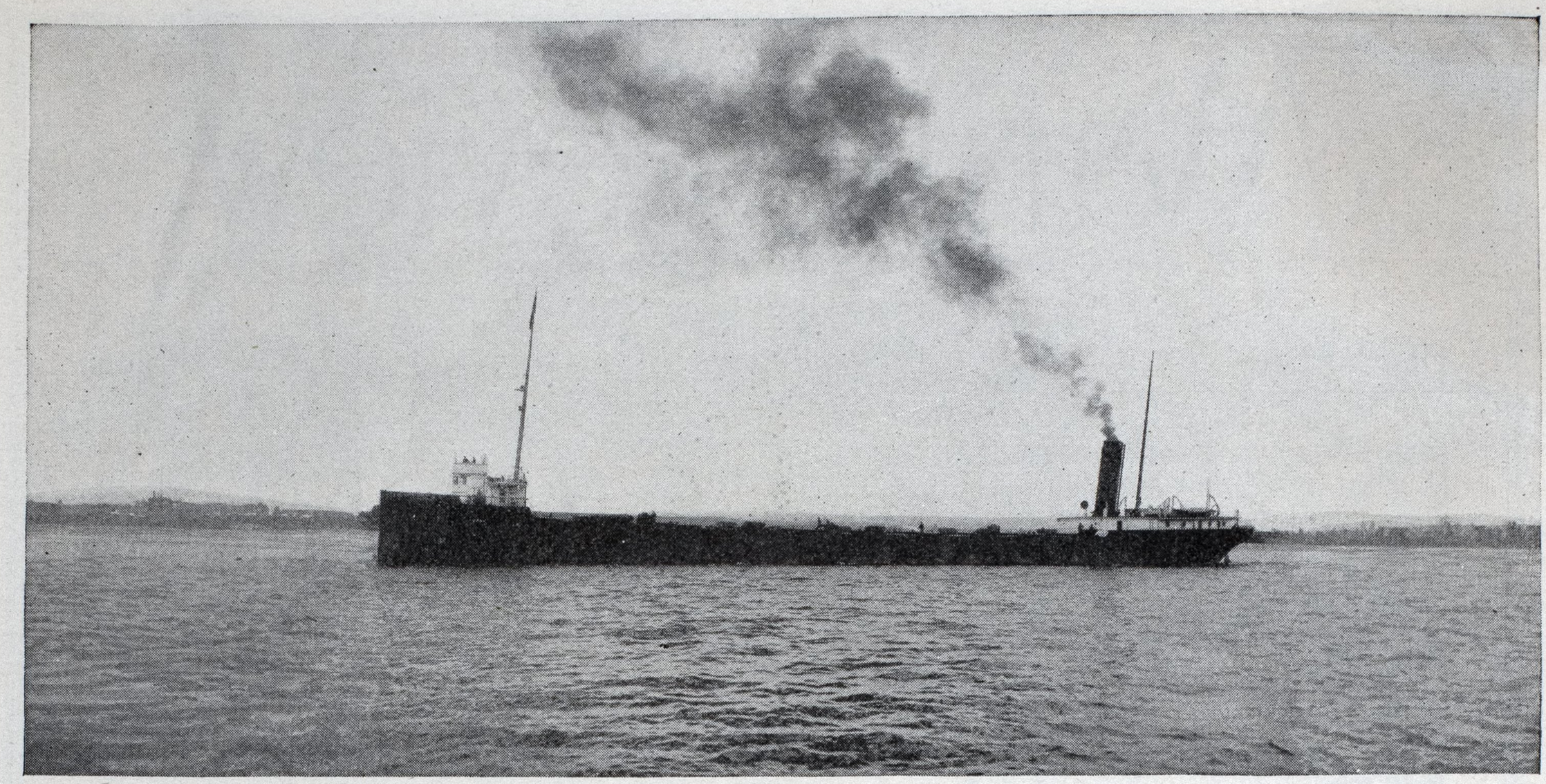
NOTE: Our authoritative treatises, "Steamships with Reciprocating Engines" and "Turbine Propelled Steamships" may be obtained, without obligation, by writing to Marine Sales Department, Vacuum Oil Company, 61 Broadway, N. Y. C.

GARGOYLE

Marine Oils

A grade for each type of service

Vacuum Oil Company — *Specialists in the manufacture of high-grade lubricants for every class of machinery Obtainable everywhere in the world* — *New York, U. S. A.*



A typical ship built by us in 1899.
Length . 346 ft.
Beam - 48 ft.
Depth - 28 ft.

30 YEARS *of complete service*

FOR thirty years The American Ship Building Company has been designing and building ships. For thirty years we have been serving these ships with the repairs necessary to keep them going.

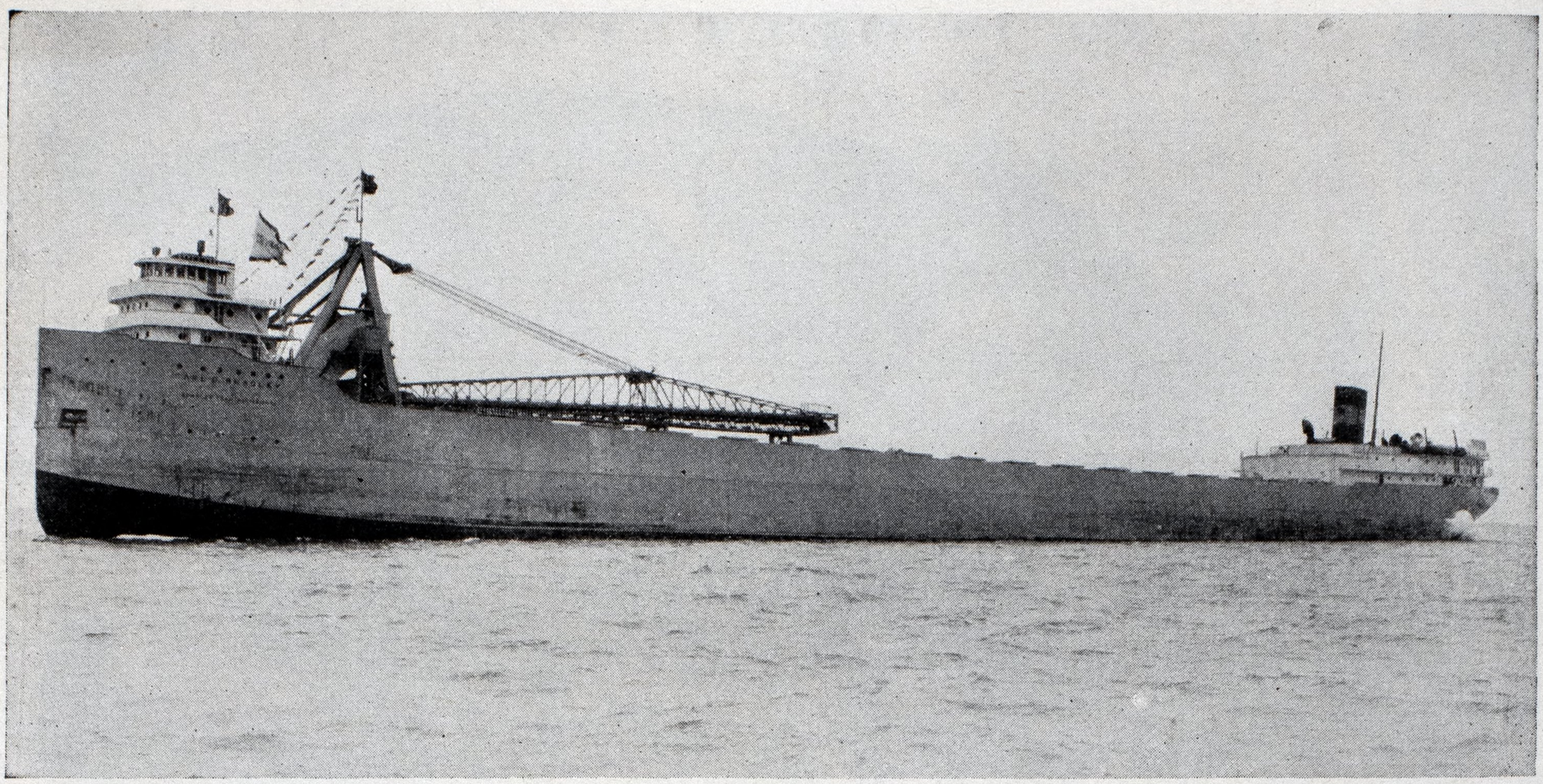
For thirty years we have maintained a corps of skilled workmen, engineers, architects and draftsmen at the strategic points on the Great Lakes. For thirty years we have provided the dry docks, floating equipment, foundries, forges and complete shop machinery for every possible kind of repair job—big or small.

The AMERICAN

CLEVELAND
American Ship Building Co.

LORAIN
American Ship Building Co.

BUFFALO
Buffalo Dry Dock Company



to ships on the Great Lakes . . .

Ship operators take all this for granted. As far back as almost any can remember, "American Ship" has been ready for every need. But ship operators are realizing, more and more, the vital necessity of these unlimited repair resources to all Lake shipping. They realize that it takes a big volume of repair work to maintain this immense equipment and man-power economically. That is why more operators are turning to The American Ship Building Company for *all* their repair work —small jobs as well as big ones.

Self unloading Steamer, one of the latest ships built by us.
Length - 615 ft.
Beam - 65 ft.
Depth - 33 ft.

SHIP BUILDING Co

SOUTH CHICAGO
Chicago Ship Building Co.

SUPERIOR
Superior Shipbuilding Co.

KILL FIRE WHILE IT IS YOUNG



ALFITE ends the menace of cargo hold fires

No menace to profitable ship operation is greater than fire in the cargo hold. You can't get at it with ordinary extinguishing methods. You have to fight it unseen.

The ALFITE System kills these hidden fires quickly and surely, and without damage to the cargo. ALFITE Gas is stored in cylinders which are connected to each hold by fixed piping. When fire breaks out the hold is instantly flooded with this fire-killing gas, penetrating every crack and corner. It puts the fire out—and keeps it out.

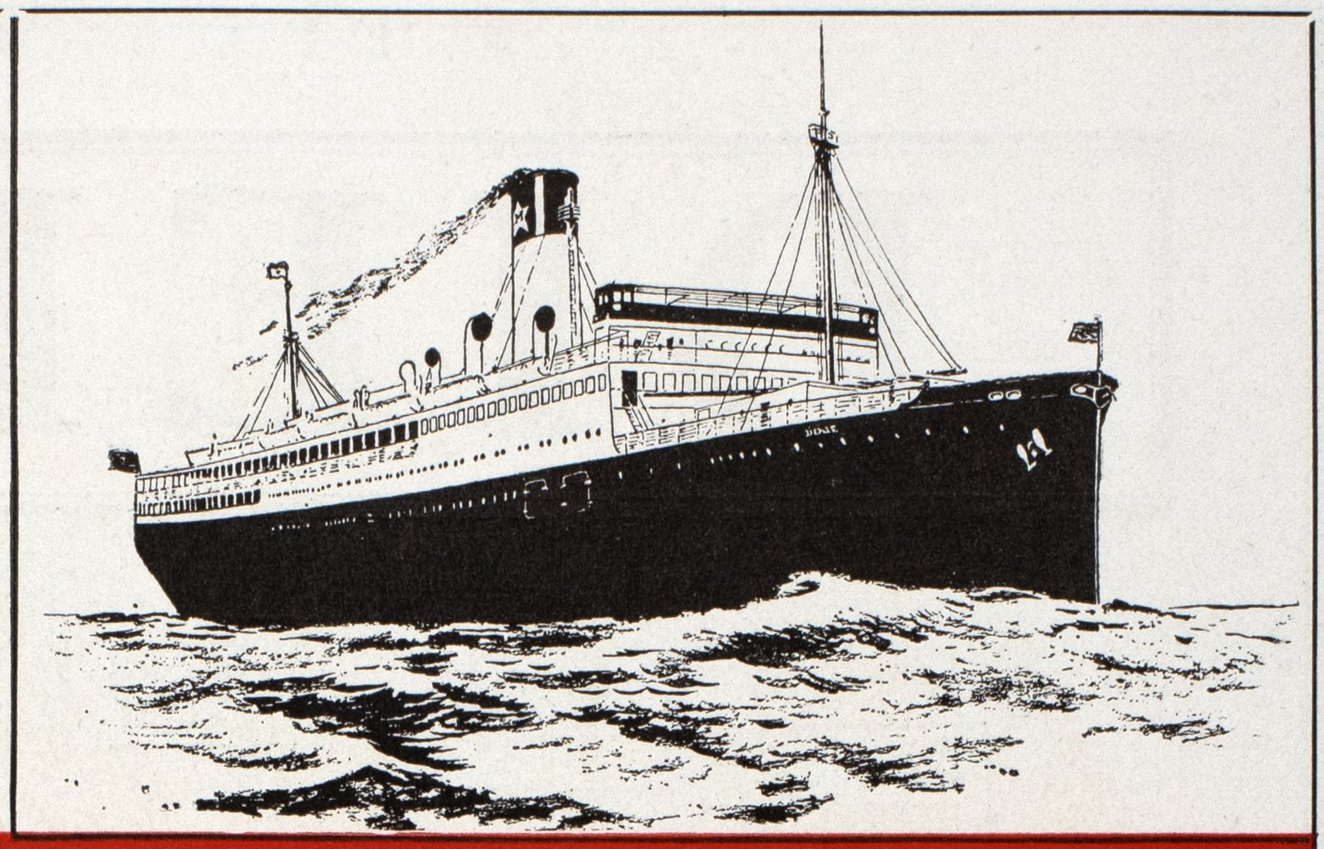
The ALFITE System is simplified protection. There are only a few working parts. A specially designed valve seals positively against leakage, yet assures complete and rapid gas discharge from the cylinder.

The ALFITE System can be installed at moderate cost. If you are interested in securing full details, call the nearest branch office or write us. American-LaFrance and Foamite Corporation, Engineers and Manufacturers, Marine Dept. J14 Elmira, N. Y.

AMERICAN-LAFRANCE AND FOAMITE PROTECTION

A Complete Engineering Service

For Extinguishing Fires



Shipping circles are intensely interested in the high efficiency machinery of the "Dixie," the first American ship to be equipped with high pressure and -temperature steam geared turbines, and water-tube boilers with air heaters. Over a year's operation has shown no machinery trouble, and the owners are highly pleased and satisfied with the performance, both mechanical and economical, of this very unusual installation. . . . .

IMPORTANT NEWS

Again and again, work that is done in the FEDERAL ship yard gets into headlines in the newspapers and makes featured stories in magazines . . . . . Sometimes it is a unique problem in engineering. Sometimes it is a deft piece of reconditioning which men who know good ships are talking about as a classic instance . . . . . Again and again a ship in our dry dock is important news in the making . . . . . Often our work on it constitutes an entire chapter in the history of ship building . . . . . The FEDERAL ship yard produced the S.S. "Dixie", the first merchant vessel in America to be equipped to operate at 350 pounds boiler pressure . . . . . We welcome such challenges to our skill . . . . . Whatever man's ingenuity can do with ships, we are equipped to do . . . . . We offer to design and construct both hull and propelling machinery for all types of merchant vessels . . . . . We also perform a large volume of repair work, large jobs and small . . . . . We have a modern yard . . . . . The favorable labor market in which we operate enables us to obtain skilled workmen in the various trades . . . . . Our joiner and cabinet work is done by an organization in business for sixty years . . . . . Our location is conveniently near New York City.

FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

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SUBSIDIARY OF UNITED STATES STEEL CORPORATION

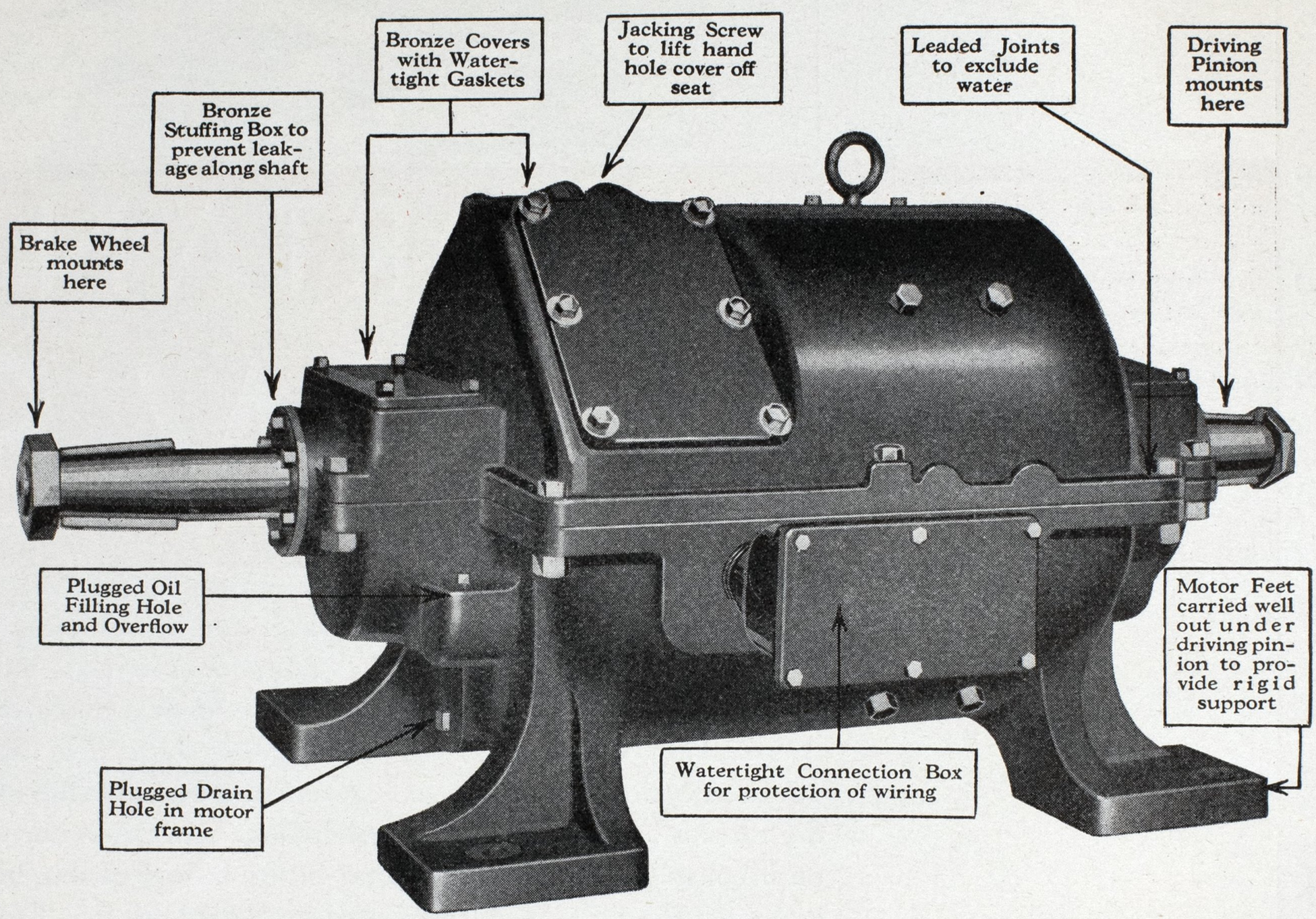
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American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
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DIEHL



Heavy Duty Watertight Deck Motor

Marine Insulation **Non-Corrodible Fittings**

designed and built in accordance with
the requirements of the

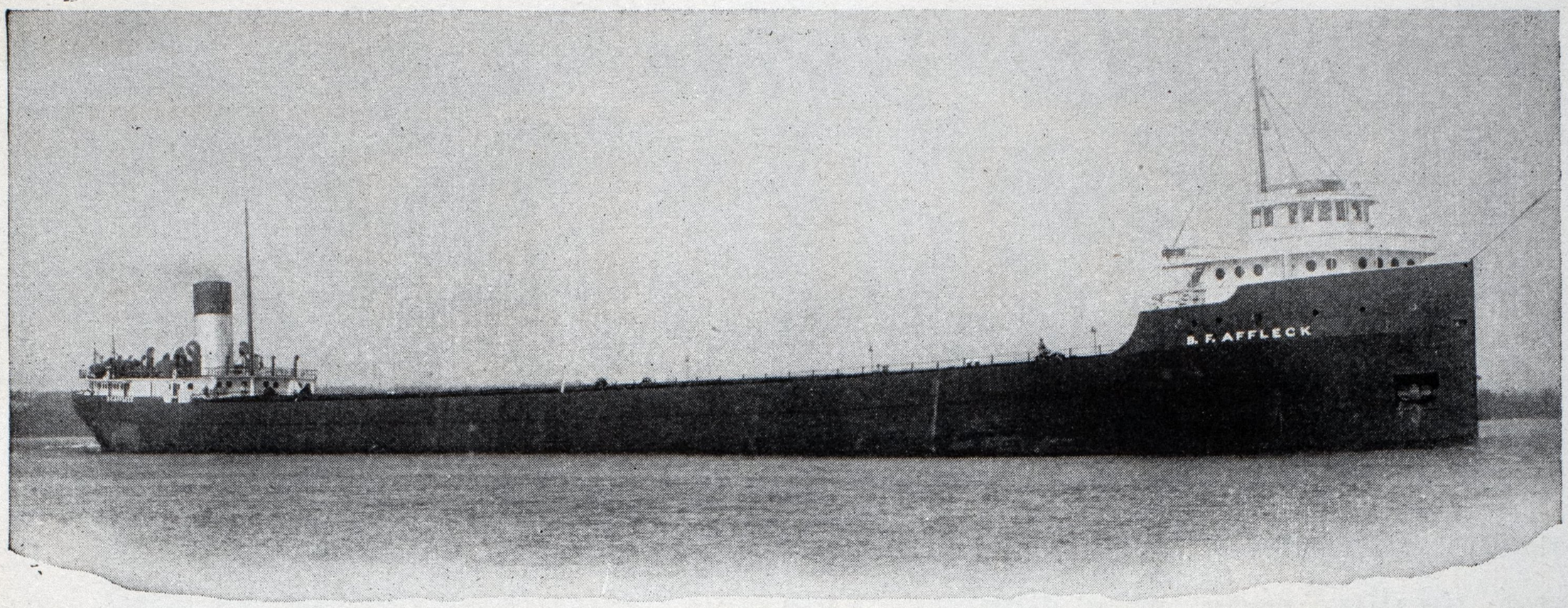
U. S. Shipping Board

by the

Diehl Manufacturing Company

Electrical Division of **The Singer Manufacturing Company**

Elizabethport, N. J.



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Finest Type of Great Lakes Cargo Carrier

S.S. B. F. Affleck owned and operated by the Pittsburgh Steamship Company, is a single deck bulk cargo vessel of the standard type built for the iron ore, coal and stone trade of the Great Lakes. Her molded dimensions are: Length overall, 604 feet, length between perpendiculars, 580 feet; width 60 feet and depth 32 feet. Capacity 12,000 tons.

A diversified experience, covering the construction of all types of ships, fully qualifies us to meet *your* requirements thoroughly and with despatch.

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Shipbuilding Company, Inc.
Toledo, Ohio

A Definite Guide to Rope Quality



It is worth a lot for buyers and users of quality equipment to be able to identify first quality rope, at a glance. This feature can now be found in all Columbian *Tape-Marked* Pure Manila Rope that is ¾ inches in diameter and larger for the new

Red, White and Blue Surface Markers

stand out prominently. These markers mean that the rope containing them is Columbian, Guaranteed by the manufacturer on the famous red, white and blue *Tape-Marker*. There is no mistaking this rope that is doubly guaranteed, but it will be a mistake not to take a few coils aboard, for Columbian *Tape-Marked* lines are unsurpassed for real service.

Columbian Rope Company

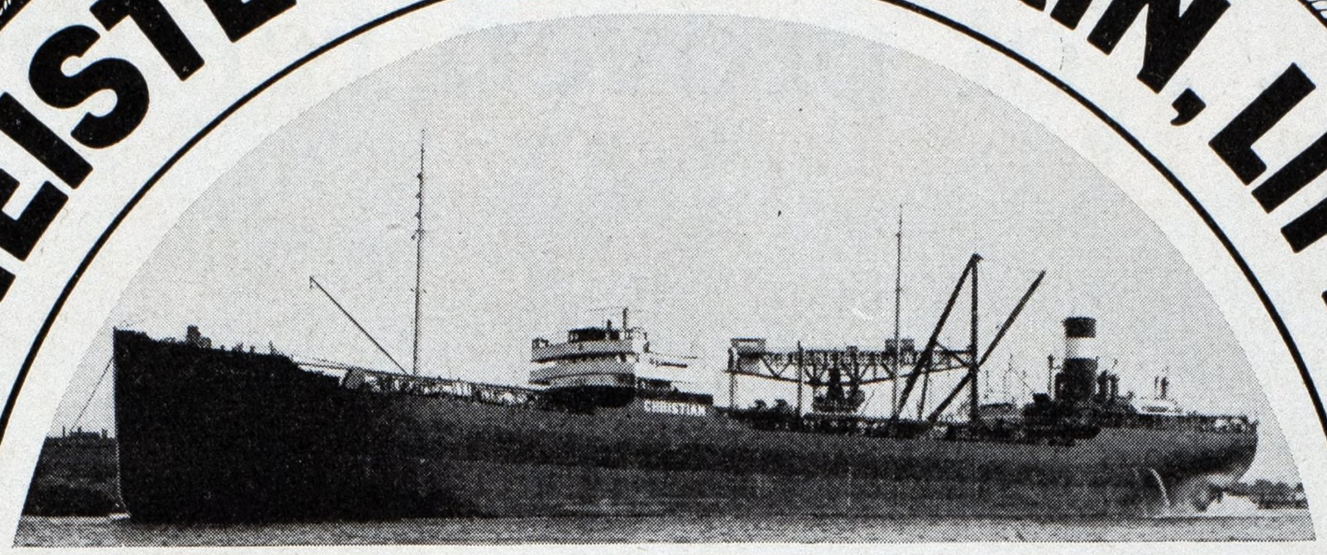
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COLUMBIAN TAPE MARKED PURE MANILA ROPE

BURMEISTER & WAIN, LIMITED



Twin Screw Dieseltanker "Christian", built and engined 1927 by Burmeister & Wain, Ltd., Copenhagen. 470 ft. x 64 ft. x 35 ft. 12,700 tons d. w.

ENGINEERS & SHIPBUILDERS

COPENHAGEN, DENMARK

The B. W. Diesel Engine for propulsion of Tankers

A constantly increasing part of the World's fleet of Tankers is powered with the original B. & W. Marine Diesel engine.

The reason why the B. & W. Diesel engine is chosen is its established record for efficiency, reliability and short overhaul in port.

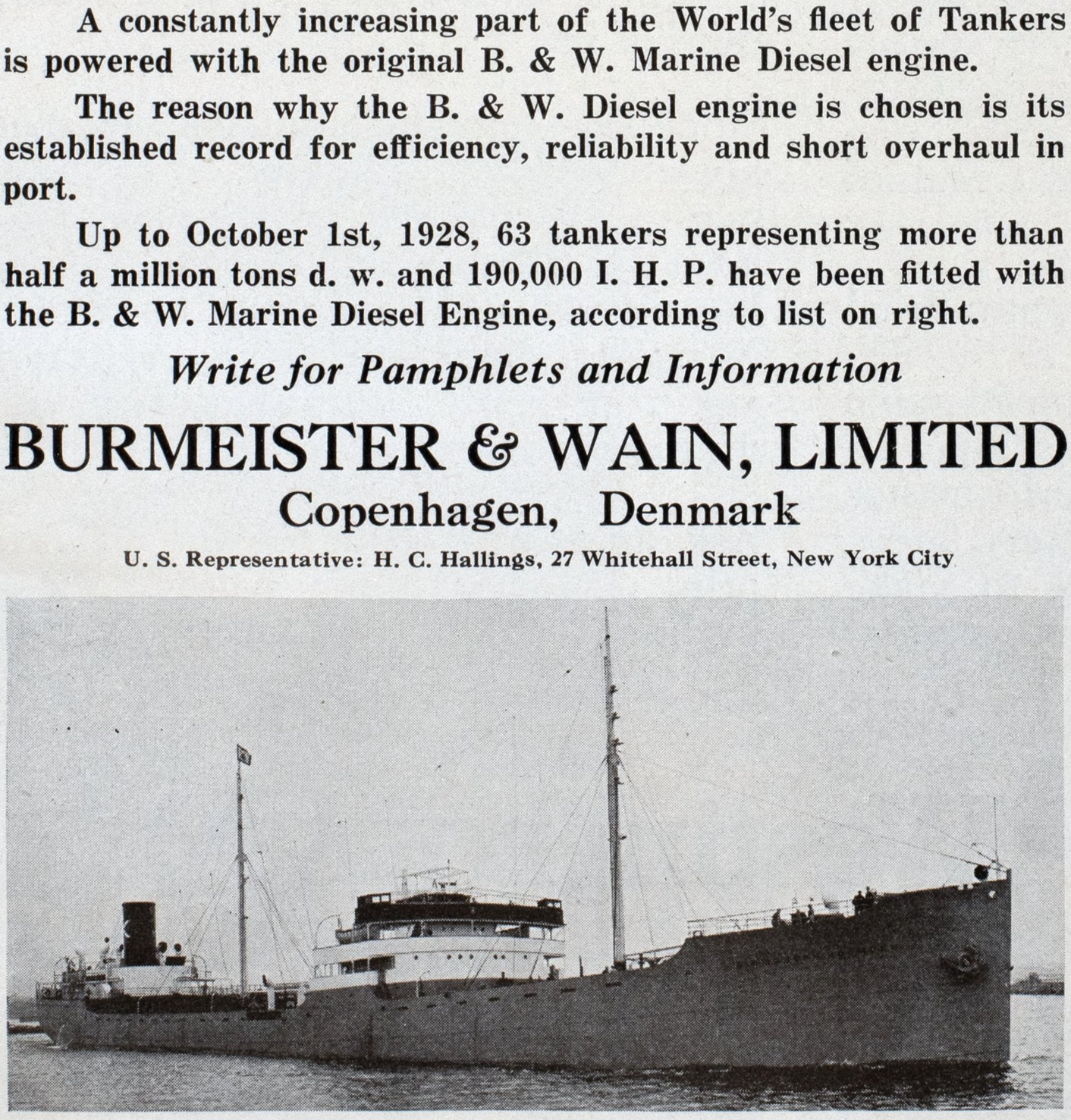
Up to October 1st, 1928, 63 tankers representing more than half a million tons d. w. and 190,000 I. H. P. have been fitted with the B. & W. Marine Diesel Engine, according to list on right.

Write for Pamphlets and Information

BURMEISTER & WAIN, LIMITED

Copenhagen, Denmark

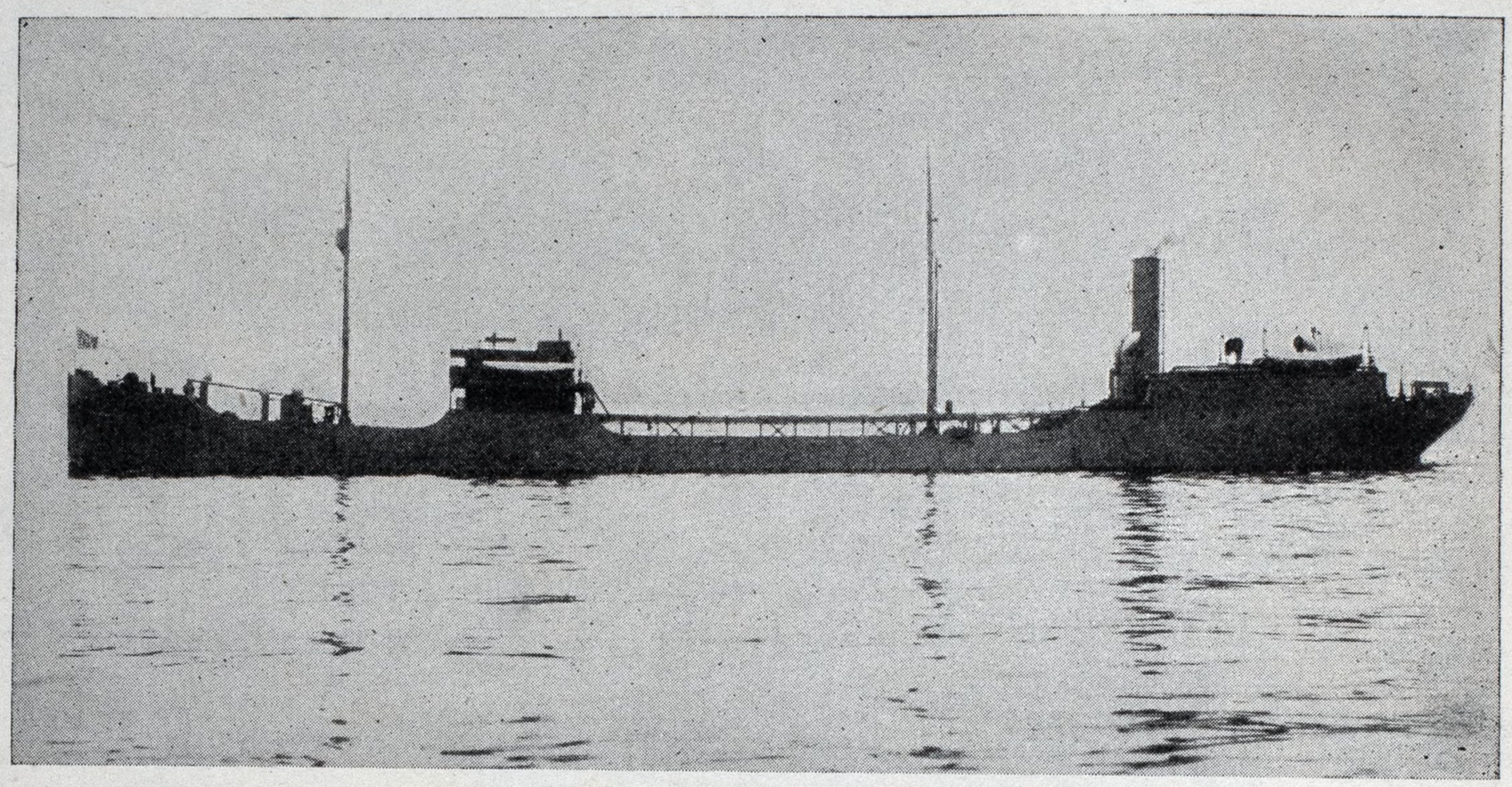
U. S. Representative: H. C. Hallings, 27 Whitehall Street, New York City



Twin Screw Dieseltanker "Sir Osborn Holmden", built and engined 1928 by Burmeister & Wain, Ltd., Copenhagen. 488 ft. 6" x 64 ft. 2" x 35 ft. 13,000 tons d. w.

Name of ship	D. W.
Abadan	9000
Agatha	3600
Alynbank	8970
Anna Maersk	8110
Athelchief	12800
Athelprince	12800
Benedick	10300
Bianca	8300
Birchbank	8970
British Courage	10000
British Faith	10000
British Hope	10000
British Reliance	10000
Britta	9000
Cedarbank	8970
Christian	12700
Clydebank	8970
Clydefield	9437
Comliebank	8970
Daghild	13000
Dagland	9000
Duivendrecht	8500
El Aleto	10000
Elmbank	8970
Emma Maersk	12250
Forresbank	8970
Glenbank	8970
Glittre	9000
Gustaf E. Reuter	9000
Hidlefjord	11050
Hilda Knudsen	12800
Ida Knudsen	12800
Inverbank	8970
Jane Maersk	11800
Java	12800
Julius Schindler	3950
Kathiawar	6550
Larchbank	8970
Le Loing	6465
Levernbank	8970
Lincoln Ellsworth	7800
Marie Maersk	12250
Markland	9000
Myrtlebank	8970
Nairnbank	8970
Nyholm	8265
O. A. Knudsen	13000
Oljaren	7700
Orkanger	10540
Ossag	3950
Paua	1050
Paula	2300
Petronella	2300
President Francqui	6500
Raila	7900
Rhea	11500
Sir Osborn Holmden	13000
Sliedrecht	6500
Solstad	8170
Storstad	13000
Svolder	9000
Varg	8206
Weirbank	8970

Double-reduction gears . . . of proven reliability



S. S. Dannedaike propelled by an 1800 shp. Westinghouse geared turbine unit.

THE S.S. Dannedaike, owned by Charles Kurz and Company, Incorporated, went into service in 1919. It is propelled by a Westinghouse complete expansion, geared turbine and *Double Reduction Gears* of the floating frame type.

During the storm when Captain Fried rescued the crew of the S. S. Florida, the Dannedaike suffered considerable hull damage which necessitated an "S.O.S." The excellent performance of the Dannedaike's machinery, however, permitted this vessel to make port unassisted. This is another proof that Westinghouse equipment stands up under trying and variable conditions at sea.

Since 1911—more than 2,000,000 shaft horsepower of this type of gear, in sizes up to 32,500 horsepower, have been installed in all classes of ships. Nearly 200 of these ships have been in regular operation for periods ranging from 5 to 13 years, with a total mileage in excess of 23,000,000.

Ask our nearest office for Reprint 354 describing Westinghouse Reduction Gears.

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SALES OFFICES IN ALL PRINCIPAL CITIES OF THE UNITED STATES AND FOREIGN COUNTRIES



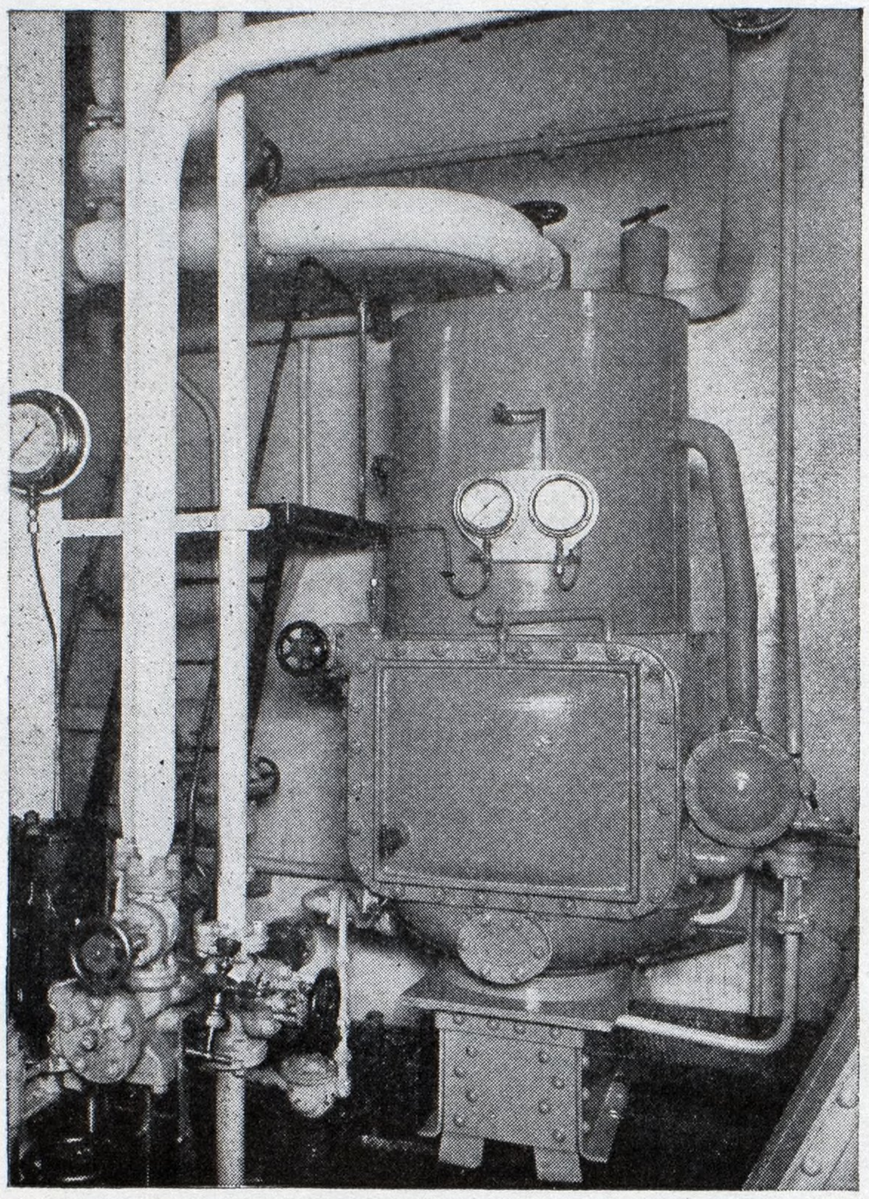
Westinghouse

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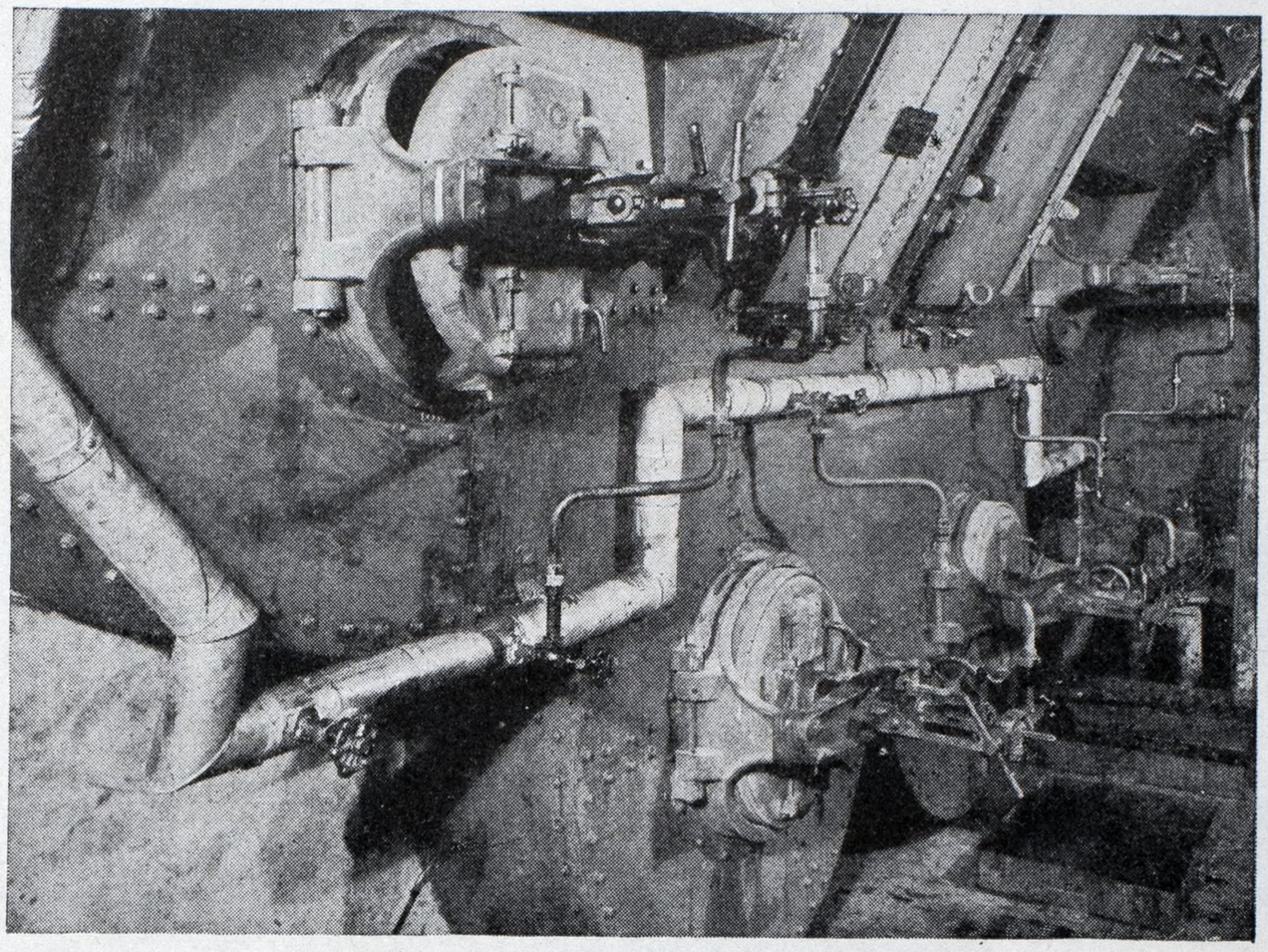
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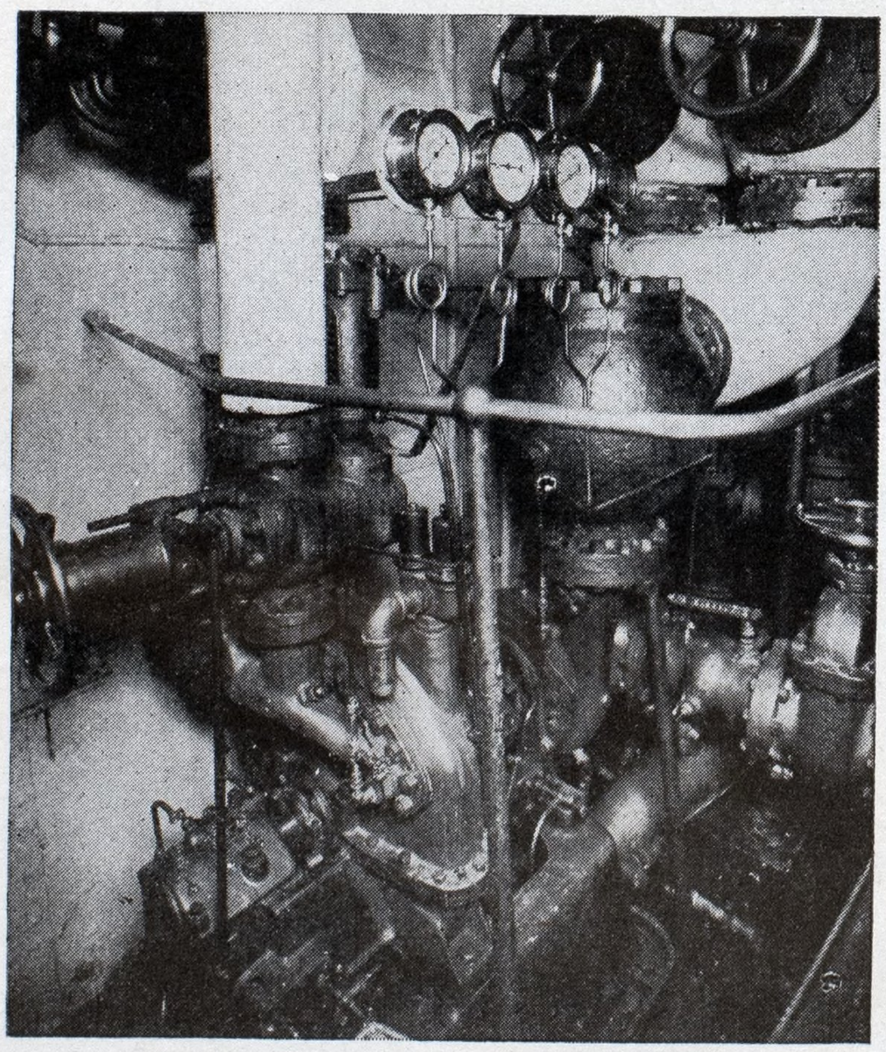
You will find Bethlehem Marine Equipment *in every type of vessel*



Bethlehem Evaporator installed in S. S. Steelore.



Bethlehem (Dahl) Mechanical Oil Burners in use on the S. S. Dorothy Luckenbach, one of the largest freighters of American registry.



Bethlehem Turbine Driven Feed Pump installed in S. S. Leviathan.

Bethlehem builds equipment to meet every auxiliary requirement of steam vessels and motorships — including all the auxiliary machinery needed in connection with a complete motorship installation. Bethlehem Marine Auxiliary Machinery is giving satisfactory service in vessels of every type from tugs, ferry boats and similar light craft to large, high-speed ocean liners.

Bethlehem Marine Auxiliary Equipment includes: Bethlehem (Dahl) Mechanical Oil Burning System, Boiler Feed Pumps, General Service Pumps, Oil Pumps, Bilge Pumps, Extraction or Condensate Pumps, Air Pumps, Feed Water Heaters, Evaporators and Distillers, Ejectors, Air Compressors, Hydrokineters, Augmenters, Steam Electric, Hydro-Electric and Hand Steering Gears, Steel Gear Transmission, Capstans, Gypsies, Windlasses, Winches, Hawser Reels, Chain Stoppers, Oil Engines, Steam Turbines, Steam Boilers, and Steam Engines.

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Sole Exporter of Our Commercial Products

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American *Hammered* Piston Rings

are standard equipment in the Diesel Engines built by

McIntosh & Seymour Corporation



The World's Largest Diesel-Electric Freighter, "Motorship Courageous", (recently converted by the Federal Shipbuilding and Dry Dock Company) is driven by McIntosh & Seymour Diesel Engines, equipped with American Hammered Piston Rings.

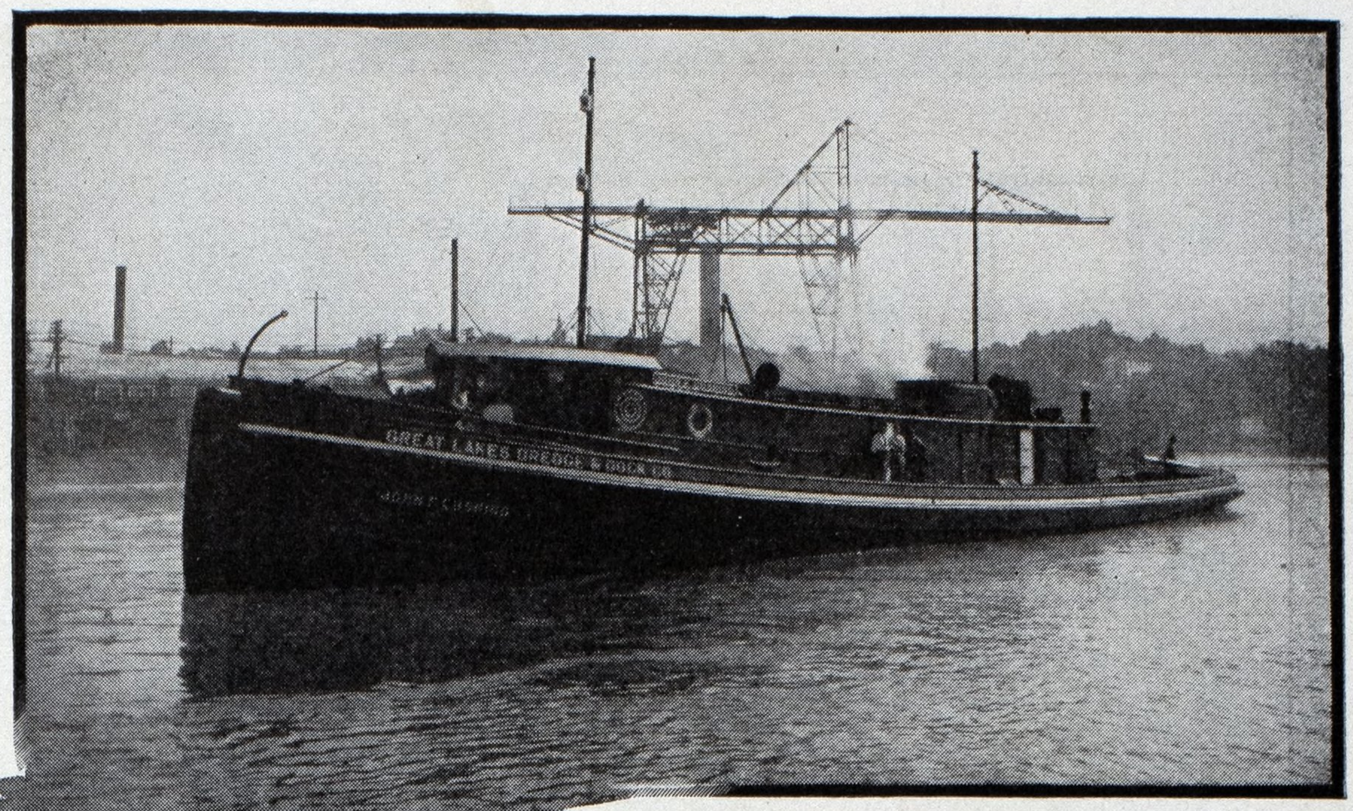
American Hammered Piston Rings are playing their part in practically every radical advancement in the Diesel Engine field.

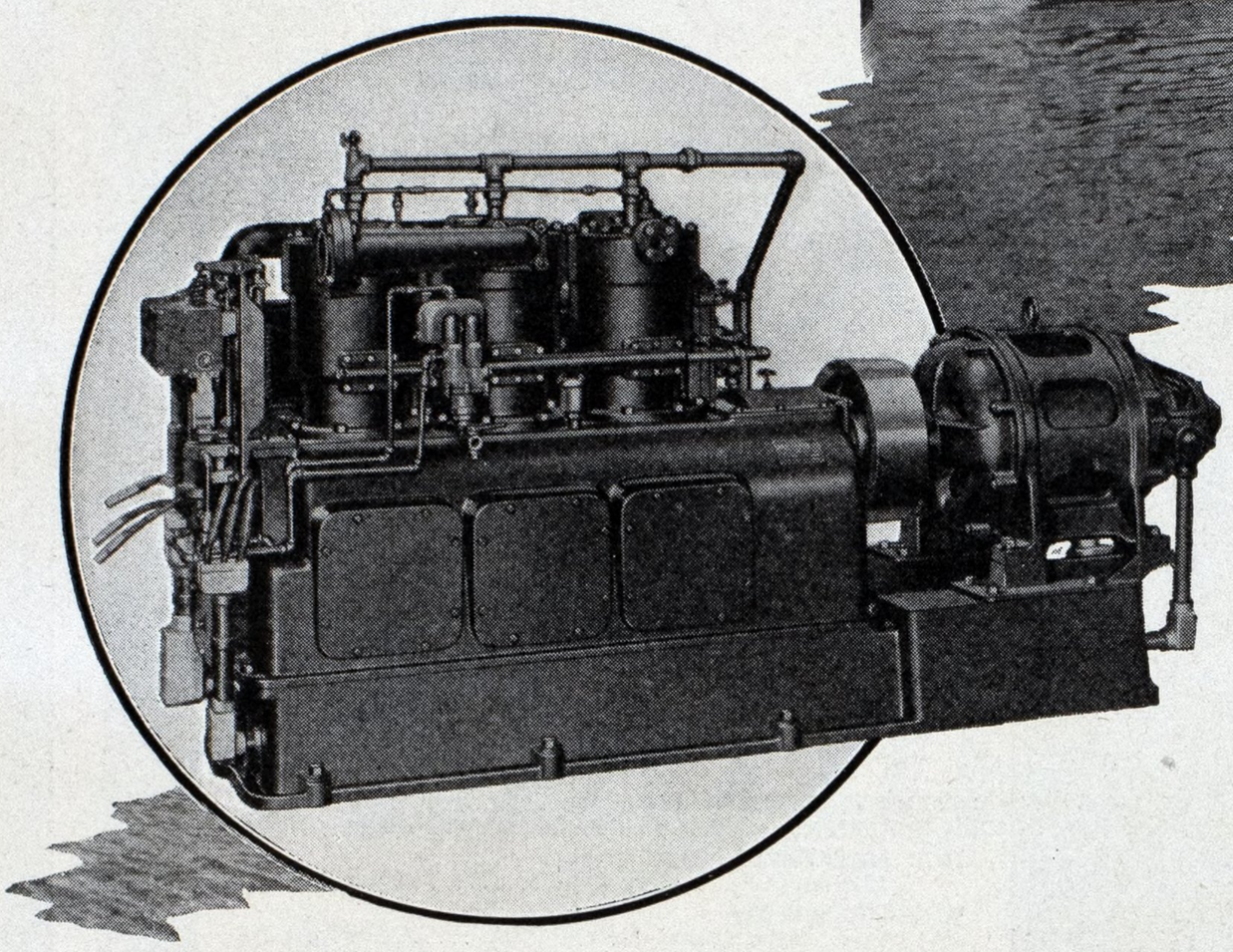


The American Hammered Piston Ring Co., Baltimore, Md.

New York Marine Branch, 11 Moore St., New York, N. Y.
Pacific Coast Marine Branches, 215 Market Street, San Francisco, Cal. 501 Pico St., Long Beach, Cal.
Detroit office, 7338 Woodward Avenue, Detroit, Michigan

"A Quality Machine for Quality Service"





THE tug John F. Cushing—truly a distinctive ship—is equipped with a Westinghouse-National Type Q-3VS-30 compressor, which furnishes air at 350 pounds pressure for starting the 1000 H.P. Diesel engine.

This compressor is one of a distinctive family. Quality is the first thought in their design, construction, and assembly. This strict adherence to high standards has established a reputation for dependability, economy of operation, and long life.

When you think compressed air for any purpose in the marine field, think Westinghouse-National.

Westinghouse Traction Brake Company
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Westinghouse-National air compressors are built in sizes ranging from 3 to 700 cu. ft. displacement, for pressures up to 350 pounds, and in motor and steam driven types. They are used on shipboard and ashore to supply air for Diesel engines, pneumatic tools, alarm whistles, paint spraying, cleaning, etc.

We also make a complete line of high grade accessories—reservoirs, hose and fittings, operating valves, cutout cocks, and the distinctive "Pneuphonic Horn" for water craft and shore signals.

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WESTINGHOUSE-NATIONAL *Air Compressors*

"QUALITY MACHINES FOR QUALITY SERVICE"



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227 Military Rd., Dearborn, Mich.....Dearborn 447
GEORGE CAIN, General Yard Supt.
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JOHN GREIG, Docking Foreman
110 Walnut St., River Rouge, Mich.....Cedar 5558-W
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GEORGE OLDMAN, Master Mechanic
89 State Rd., Ashtabula, Ohio.....Ashtabula 2117-J

Great Lakes Engineering Works

Shipbuilders and Engineers

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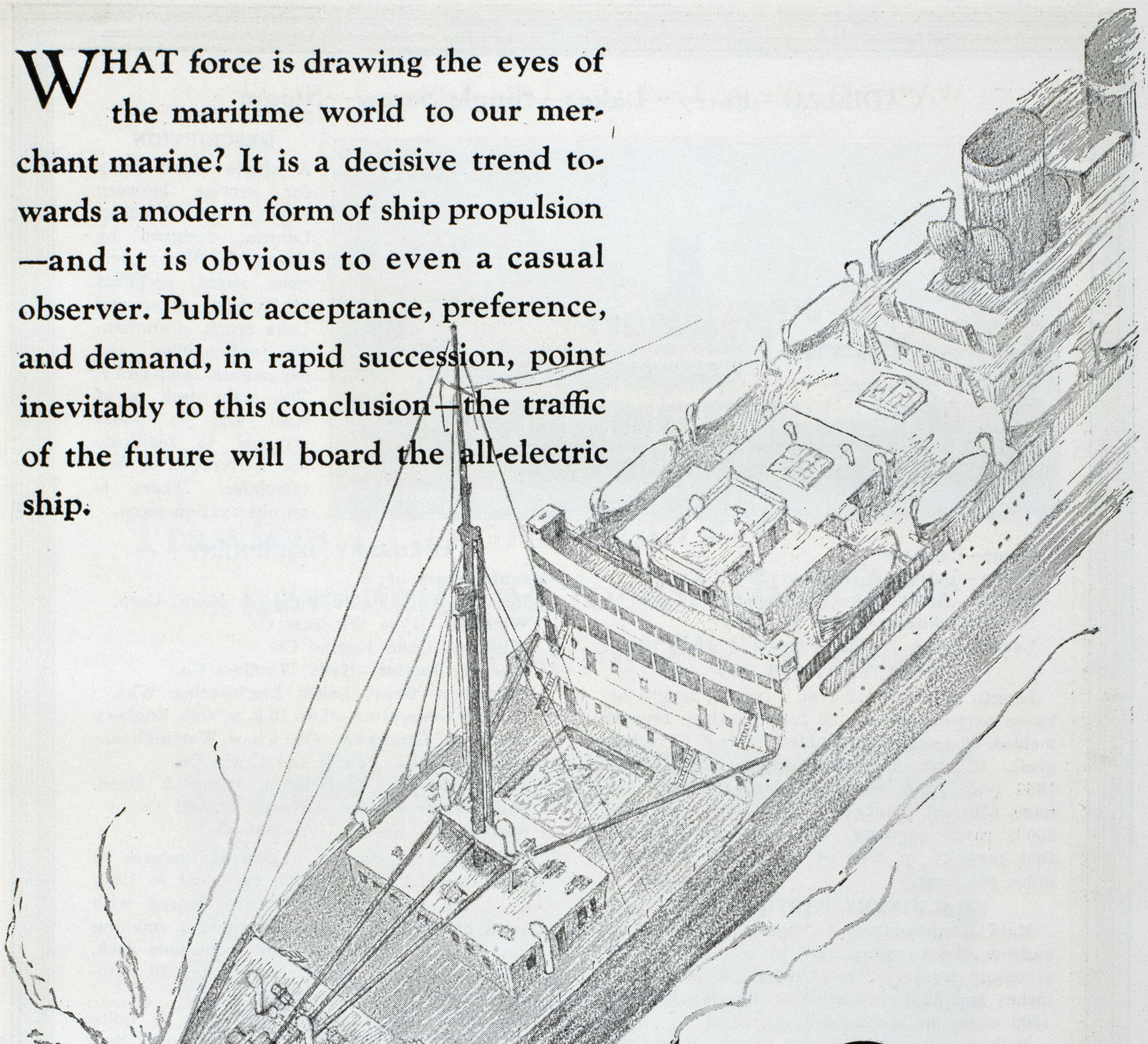
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Cleveland Office: Union Trust Bldg.

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Complete Shipbuilding Dry Dock and Repair Facilities
River Rouge, Mich., and Ashtabula, Ohio

WHAT force is drawing the eyes of the maritime world to our merchant marine? It is a decisive trend towards a modern form of ship propulsion —and it is obvious to even a casual observer. Public acceptance, preference, and demand, in rapid succession, point inevitably to this conclusion—the traffic of the future will board the all-electric ship.

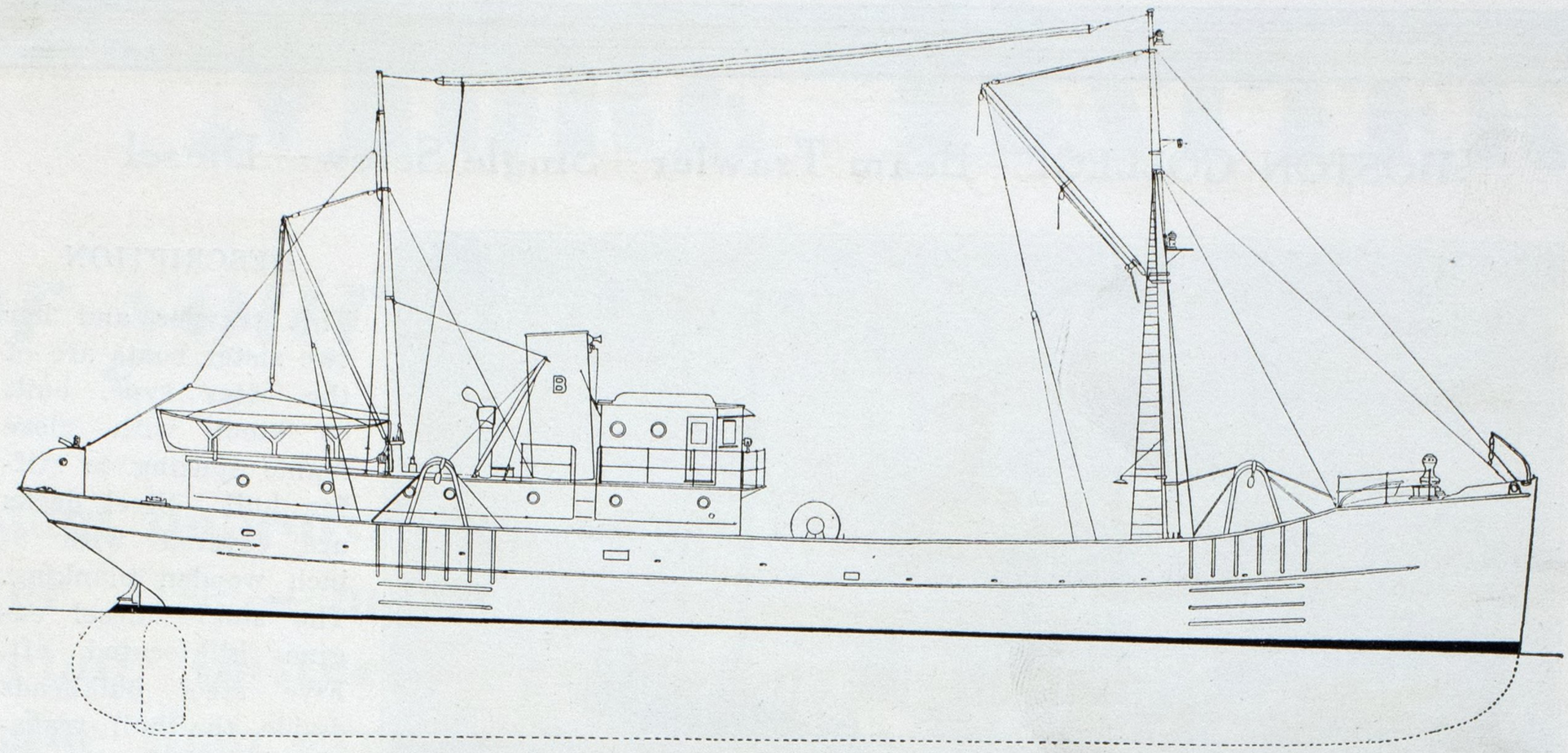


General Electric manufactures complete turbine propulsion machinery, electric equipment for ships' auxiliaries and Diesel-electric drive, searchlights, and other marine accessories. Descriptive literature or the services of a marine engineer specialist will be furnished promptly if requested of the nearest G-E office.

173-3

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES



Trawlers EBB and FLOW--
now building for the Bay State Fishing Co. of Boston



BATH IRON WORKS CORPN.

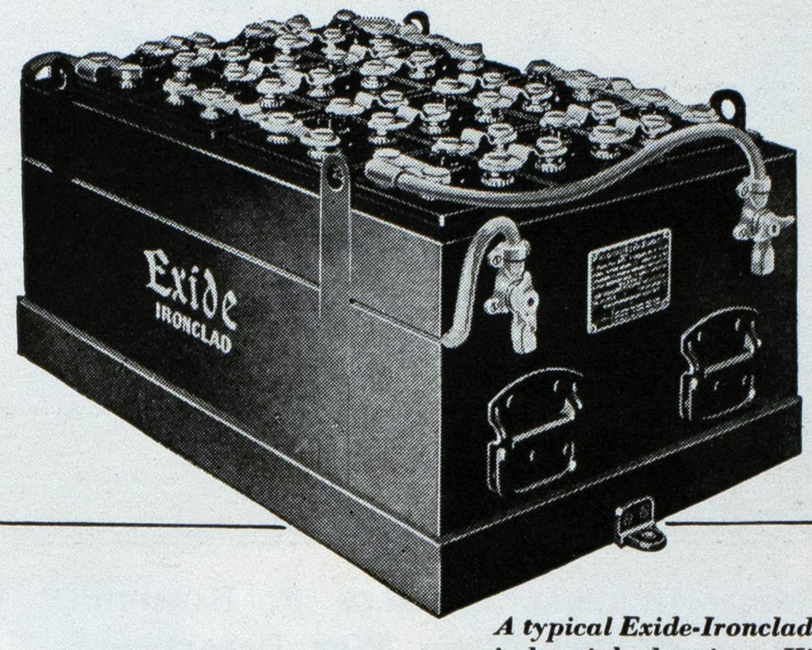
Shipbuilders and Engineers

BATH, MAINE, U. S. A.

MORE BATTERY

for your Money . . .

Constant improvements assure longer life — make Exide-Ironclad Batteries greater value than ever before!



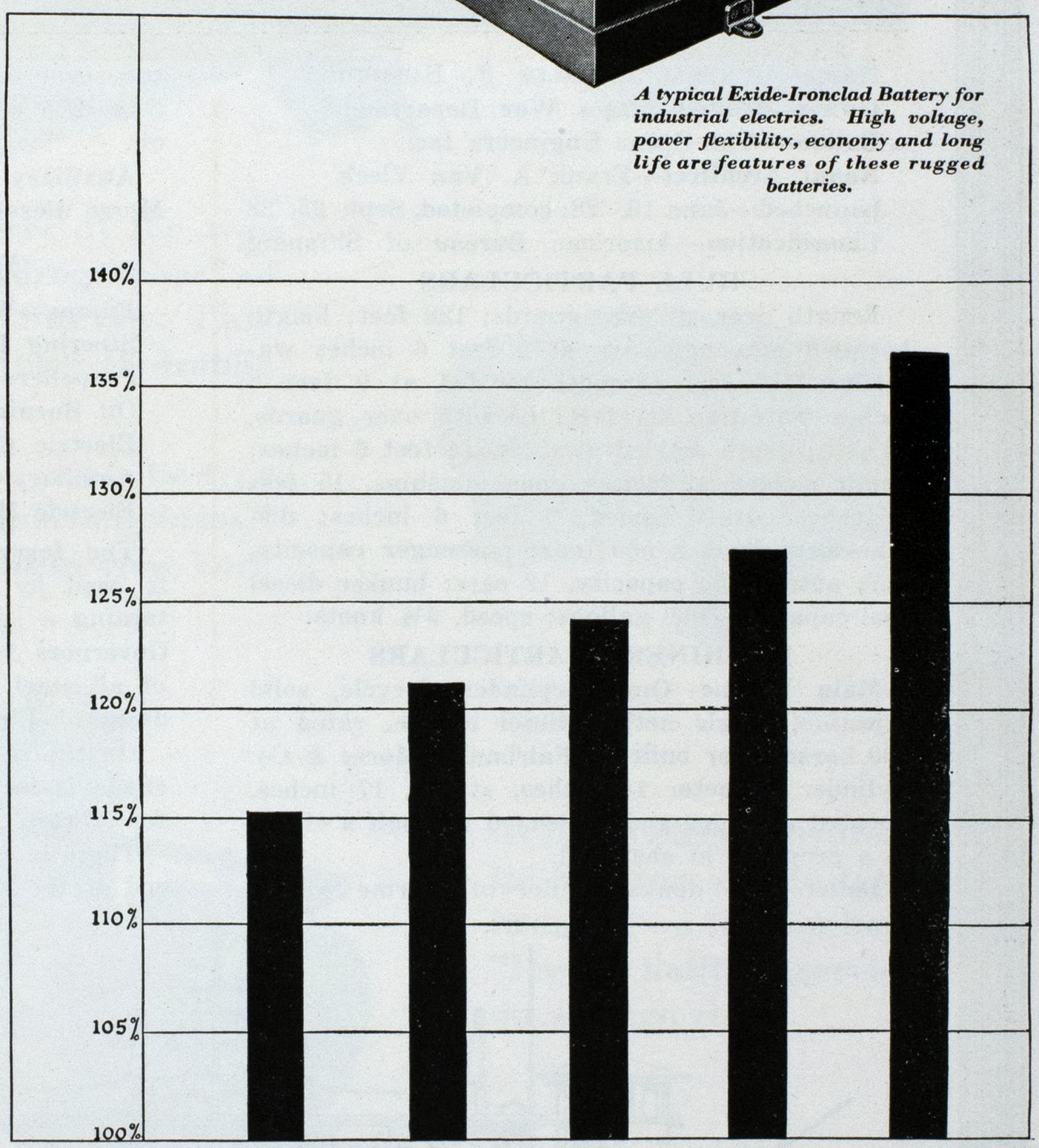
A typical Exide-Ironclad Battery for industrial electrics. High voltage, power flexibility, economy and long life are features of these rugged batteries.

More battery for your money! That's what Exide-Ironclads offer to users of electric industrial trucks today.

Constant improvements in design and construction have resulted in an increase of 36.4% in the life of these remarkable batteries in the last 5 years.

And in spite of longer life, prices are lower. Hundreds of users have their entire fleets equipped with Exide-Ironclads, and agree that these batteries are the best buy for electric trucks and tractors.

Buy one of these dependable, long-lived batteries. Put it in one of your own industrial electrics and check its performance carefully. It will show you, convincingly, how Exide-Ironclad Batteries can help you cut costs in material handling.



A 36.4% INCREASE IN LIFE IN FIVE YEARS! This chart shows how constant improvements in construction have resulted in a steadily increased life in Exide-Ironclad Batteries.

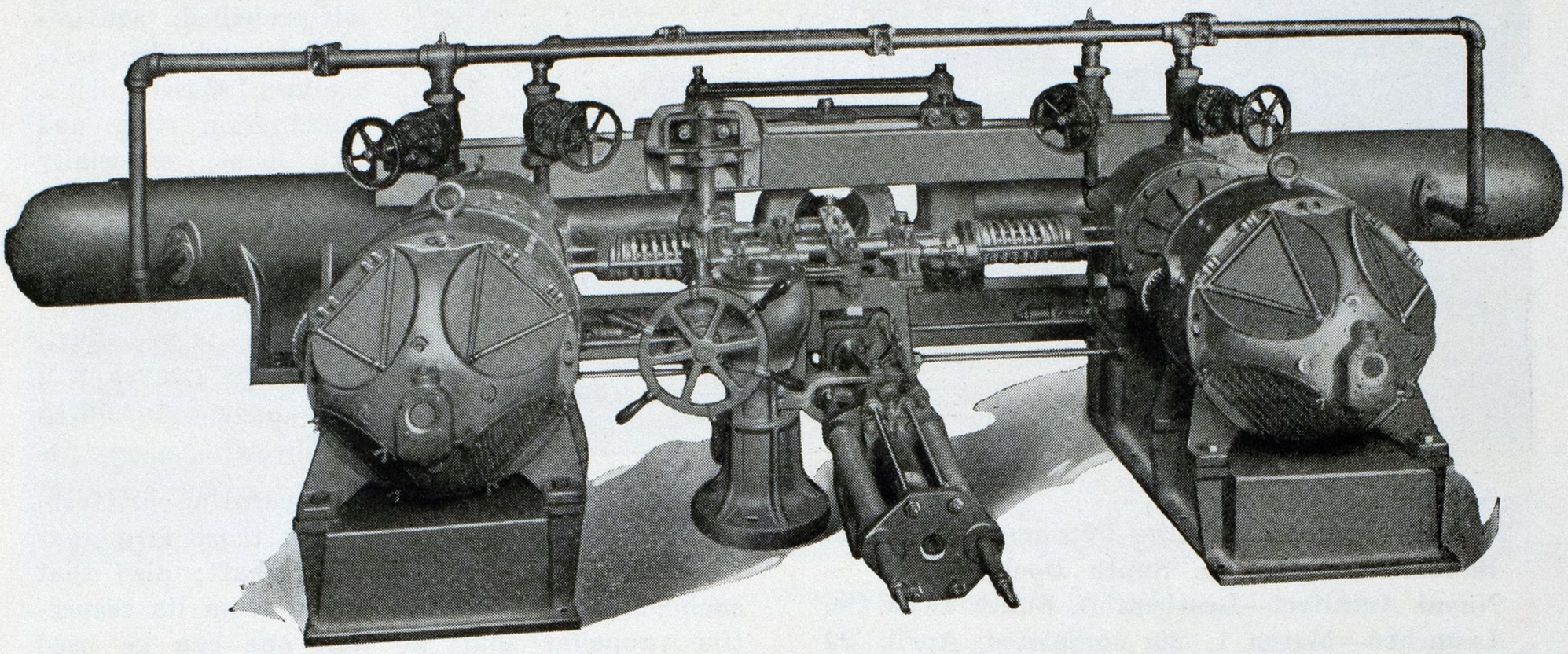
Exide
IRONCLAD
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

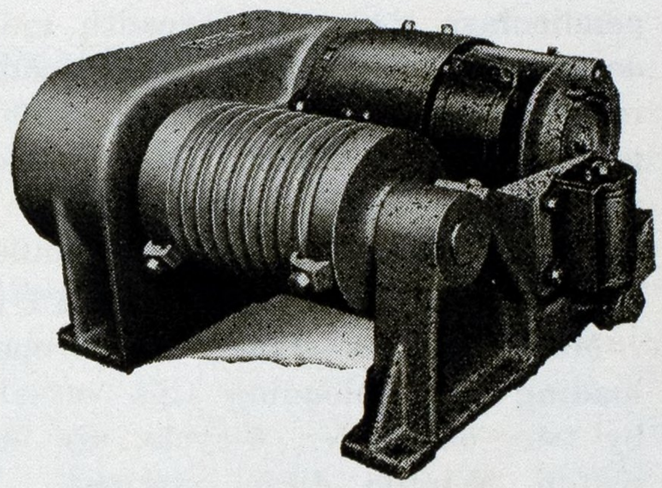
Distinctive A-E-CO Equipment

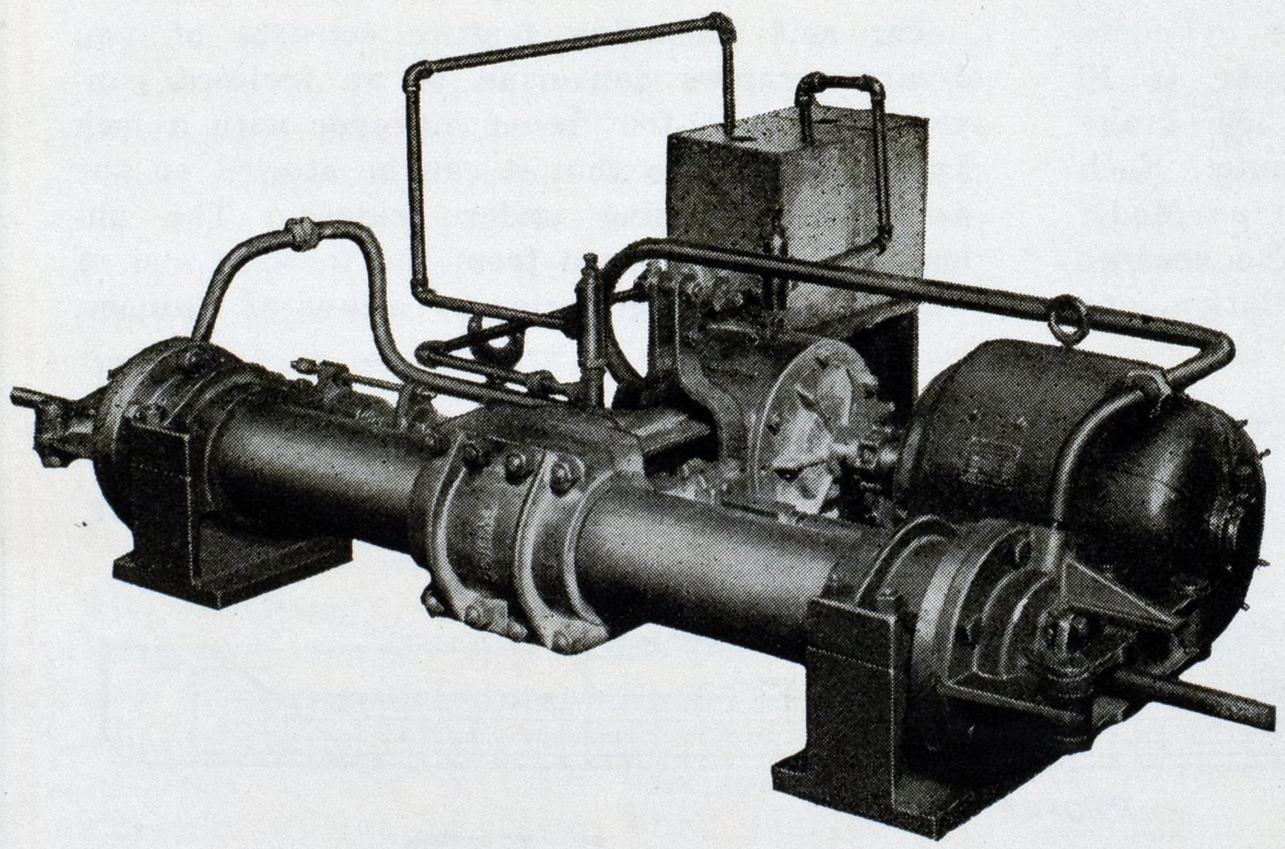
on the Year's Distinctive Ships



Above—Electro-hydraulic Steerer of the type designed for the motorship "Hydrographer" of the U. S. Coast and Geodetic Survey. This Steerer is operated by a Hele-Shaw Hydraulic Pump and Electric Motor.

At right—A-E-CO Electric Steerer of the type installed on the ferry boat "General Humphries," operated by the War Department in New York harbor.



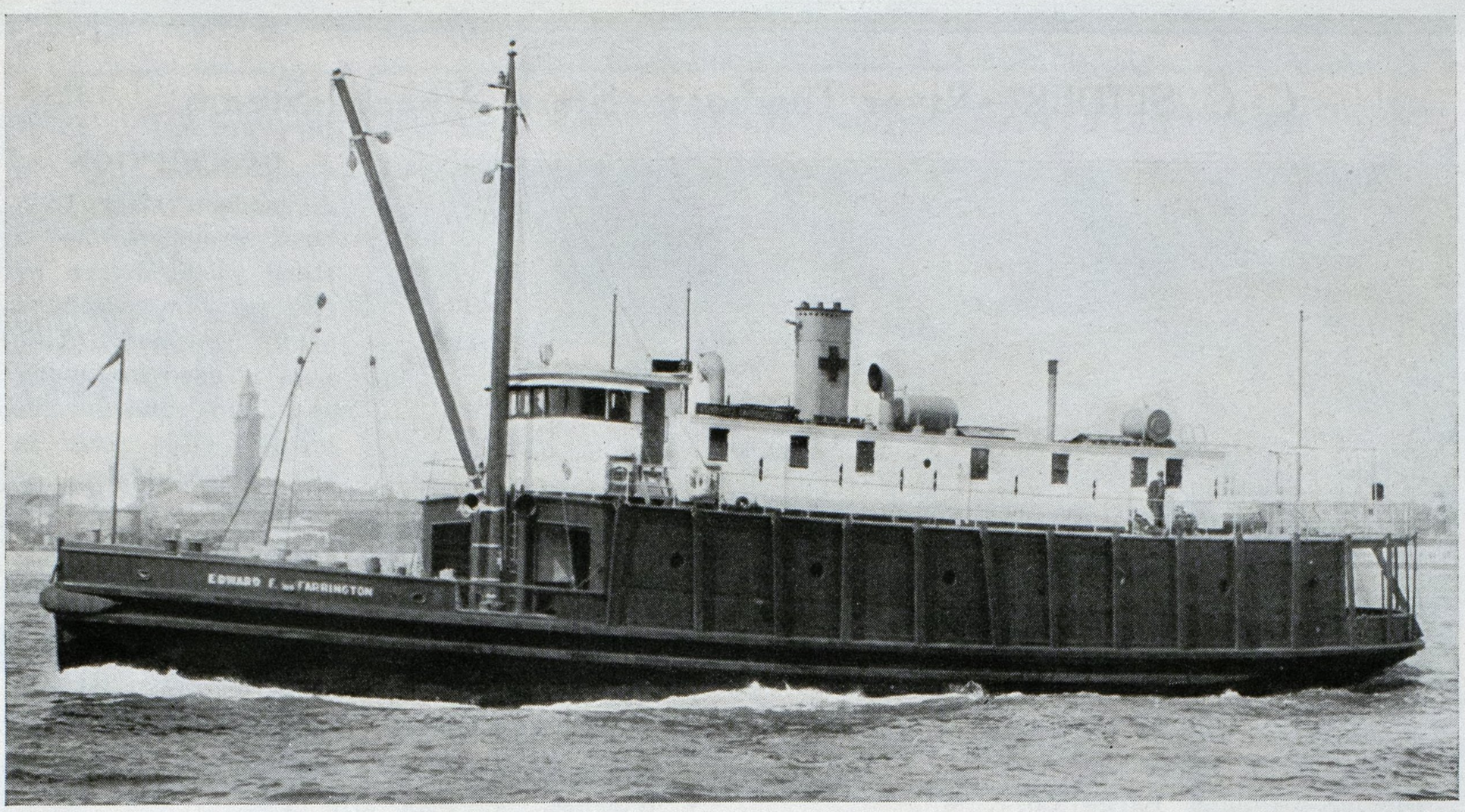


At left—Electro-hydraulic Steerer of the type installed on the tow-boat "Incor," built for service on western rivers.

Write for catalogues of Steam, Electric and Electro-hydraulic Steerers, Windlasses, Winches and other deck auxiliaries.

AMERICAN ENGINEERING COMPANY

2437 Aramingo Avenue Philadelphia, Pa.



The *Edward F. Farrington*, a Winton-powered Freight Boat

A MODERN FREIGHT BOAT

Winton-Diesel Engines—Electric Drive

THE steel Diesel-Electric freight boat Edward F. Farrington, owned by the Middlesex Transportation Company, New Brunswick, N. J., was built by the Bethlehem Shipbuilding Corporation from the design of Eads Johnson, M. E., Inc., 115 Broadway, New York City.

This boat is the most modern commercial ship of the small inland carrier type afloat on the Atlantic Seaboard. She is built entirely of steel, with steel freight house on the main deck, the forward doors of which are of the rolling type—a novel feature and a splendid adaptation of the type of door so long used ashore, where maximum clear opening and complete housing are necessary. She is 130 ft. long overall, 120 ft. water line, 30 ft. beam, 12 feet deep, and carries 100 tons of freight on 7 ft., 6 in. mean draft.

Her machinery, controlled entirely from the pilot house, consists of two 250 b.h.p. Winton-Diesel Engines direct-connected to two 165 k.w. Generators and two 15 k.w. Exciters. Inasmuch as she is used principally in the congested waters of New York Harbor and vicinity, where ease and celerity in maneuvering are vital to profitable operation, this type of drive—Diesel-Electric—is ideal. The control is extremely simple, easily understood, and can be placed anywhere on the ship.

The propelling motor is of 400 s.h.p. double armature type, controlled on the Ward-Leonard system. All electrical units were furnished by the General Electric Company. The steering gear is electrically controlled by a Cutler-Hammer helm angle follow-up type, mounted on brass pedestal in pilot house. A hand gear is also installed, and is of the Eads Johnson design—immediately controllable type. A Lidgerwood double drum, electrically driven, cargo hoist, operated by control levers in the pilot house, is located in the forward hold.

There are two fuel tanks of a combined capacity of 4000 gallons, which will give at least 200 hours full power service. An auxiliary Diesel generator set, air compressor, bilge and fire pumps, and one motor-driven fresh water pump, complete the machinery installation. All fittings are the best for the service.

The boat carries freight from New Brunswick, N. J., to New York, and distributes it to various steamship and railroad piers in New York Harbor, enlarging the service inaugurated by the Middlesex Transportation Company in 1903, and maintained continuously ever since.

The Winton Engine Company

Cleveland, Ohio, U. S. A.

THE EXPORT S. S. CORP.

SOUTHERN PACIFIC STEAMSHIP LINES

FURNESS WITHY & CO., LTD.

"The Standard for All Marine Installations"

Argonaut Steamship Line

Panama Mail S. S. Co.

Silver Line, Ltd.

Panama Pacific Line
INTERNATIONAL MERCANTILE MARINE COMPANY

IMM

AGWI LINES

STANDARD OIL CO. OF NEW JERSEY

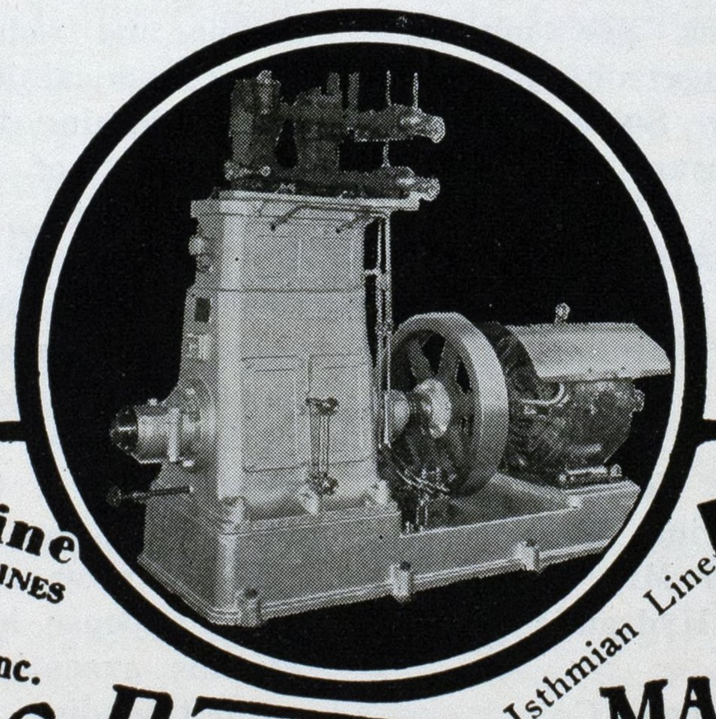
LUCKENBACH

BRUNSWICK-KROESCHELL REFRIGERATION

The endorsement of Brunswick-Kroeschell Refrigeration through selection by so many of the leaders in the marine field is indeed a significant tribute to Brunswick-Kroeschell engineering and craftsmanship.

There are over 2500 Brunswick-Kroeschell refrigerating plants installed on vessels of all types, from the largest passenger or freight ships down to the smallest pleasure craft.

BRUNSWICK-KROESCHELL COMPANY
Refrigerating & Ice Making Machinery
NEW BRUNSWICK, N.J. - CHICAGO, ILL.
BRANCHES, AGENCIES AND SERVICE IN PRINCIPAL CITIES



CANADA STEAMSHIP LINES

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FINEST FASTEST SERVICE GRACE PANAMA-PERU-CHILE

Vacuum Oil Co.

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OF THE EASTERN STEAMSHIP LINES

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ALASKA STEAMSHIP CO.

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TEXACO
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Atlantic Refining Co.

Black Diamond S. S. Corp.

STANDARD OIL COMPANY OF CALIFORNIA

Red D Line

Matson Navigation Company

CITIES SERVICE OILS
ONCE - ALWAYS

CLYDE LINE

MUNSON STEAMSHIP LINE

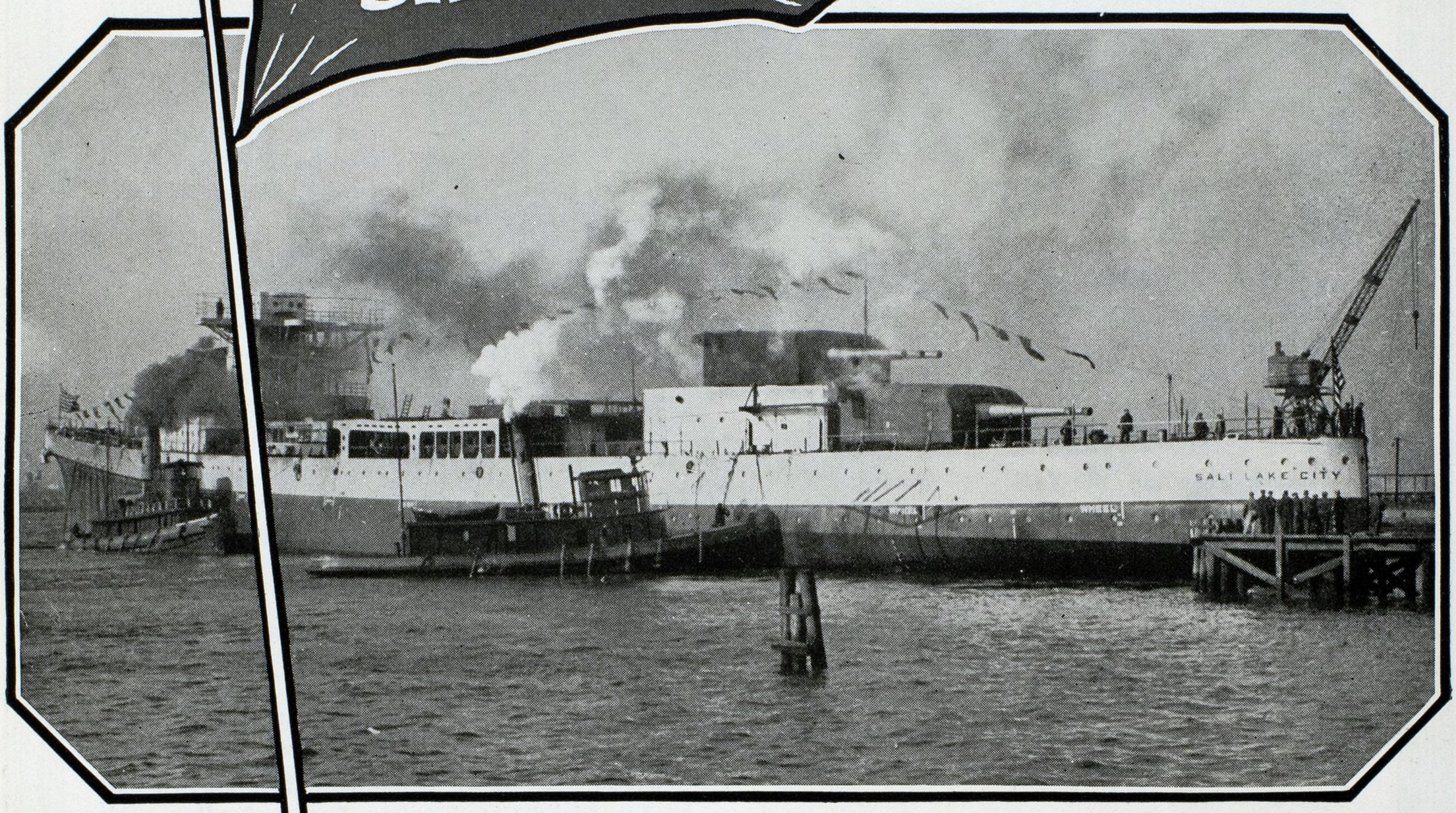
AMERICAN-HAWAIIAN

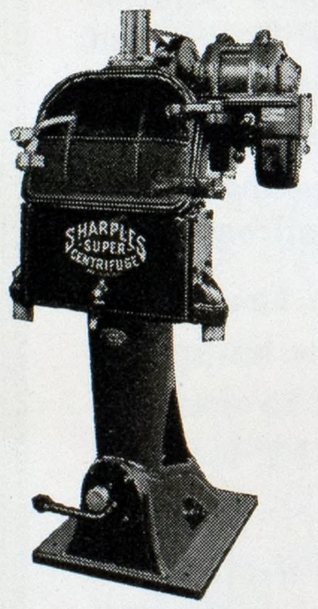
THE PANAMA CANAL LINE A-H

A. H. Bull

Lamport & Holt

Aboard the New U·S·CRUISER SALT LAKE CITY





Uncle Sam's newest and fastest Battle Cruiser—the "Salt Lake City," recently launched at Camden, N. J.—is fitted with the finest and most modern equipment in every detail, even down to its oil purification system. For this important job, Sharples Oil Purifiers were selected.

One Sharples "Presurtite" Super Centrifuge will insure FUME-PROOF purification of the fuel oil; and one Open Type Sharples will keep the "lube" oil continuously at its highest lubricating efficiency.

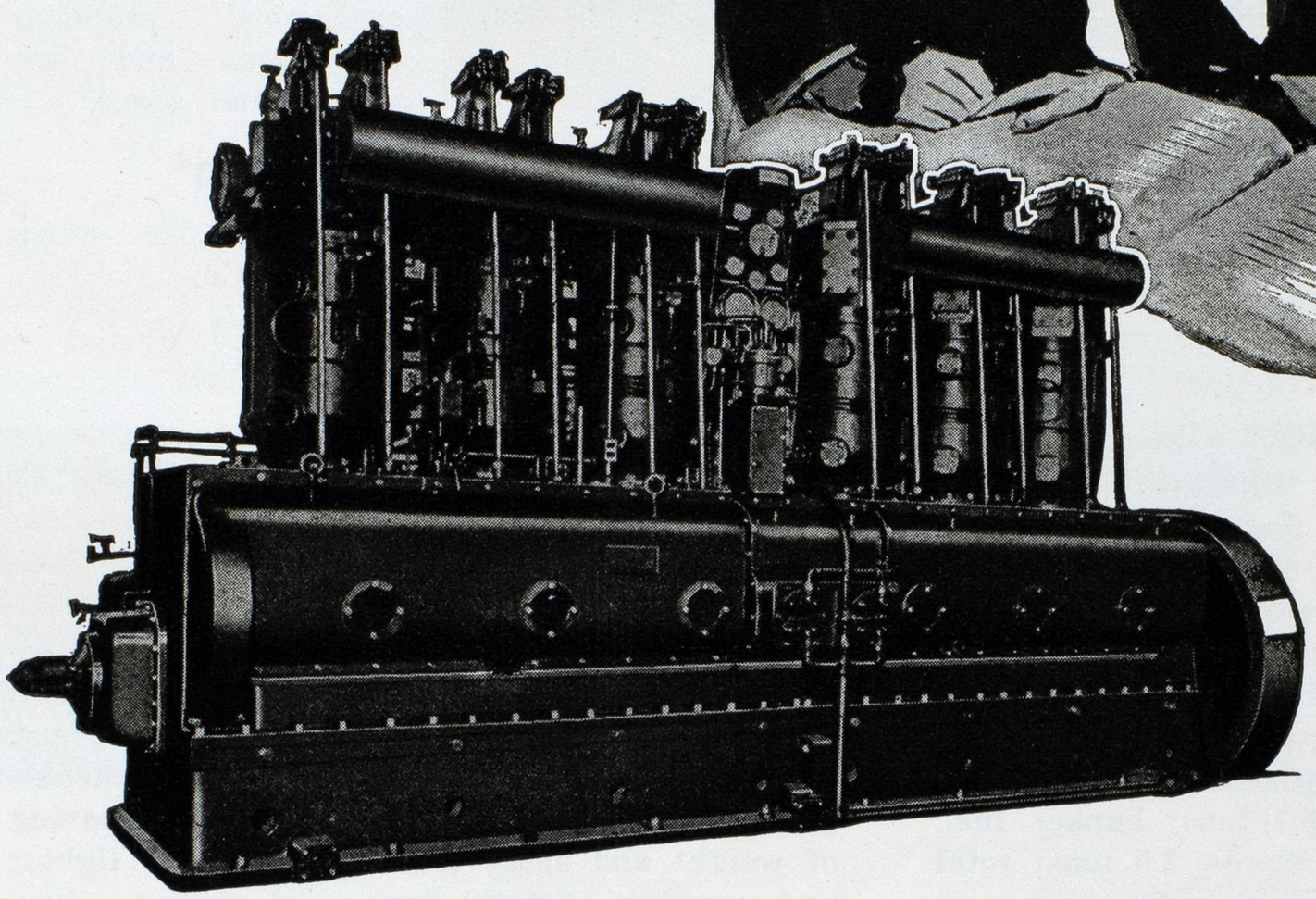
"There is no substitute for Sharples Oil Purification!"

THE SHARPLES SPECIALTY COMPANY, 2338 WESTMORELAND STREET, PHILADELPHIA.
Boston, New York, Pittsburgh, Chicago, Detroit, Tulsa, New Orleans, San Francisco, Los Angeles, Montreal.
Super Centrifugal Engineers, Ltd., Aldwych House, London, W. C. 2, England; Ste. Ame. Des Appareils Centrifuges, Rueil (Seine-et-Oise) 70, Rue Du Vieux—Pont, Paris, France; Tatsumi Commercial Corporation, Marine Insurance Building, Tokio, Japan.

SHARPLES
A GREAT FORCE

Diesels have changed red figures to black for more than one ship





The remarkable economy of the Diesel engine as a prime mover in the marine field has, in many cases, changed losses to profits.

For example, here are some of the savings typical of Ingersoll-Rand engines: The cost of fuel for a certain tugboat equipped with two I-R solid-injection Diesel engines of 340 b. hp. each is approximately $24 per 24-hour day. Fuel for an equivalent oil-fired steam tug would average $104. This means a difference of $80, or 77% saving in fuel alone in favor of the Diesel-electric drive.

A Hudson River ferryboat, equipped with a 220-b. hp. I-R engine, has been in operation for six years and has not lost one day because of engine trouble. This sort of reliability keeps maintenance costs at a low figure.

Records like those cited above, plus the savings effected by greater maneuverability, greater availability, absence of stand-by losses, and low maintenance and labor costs, make the Ingersoll-Rand engine a prime mover that you cannot afford to overlook.

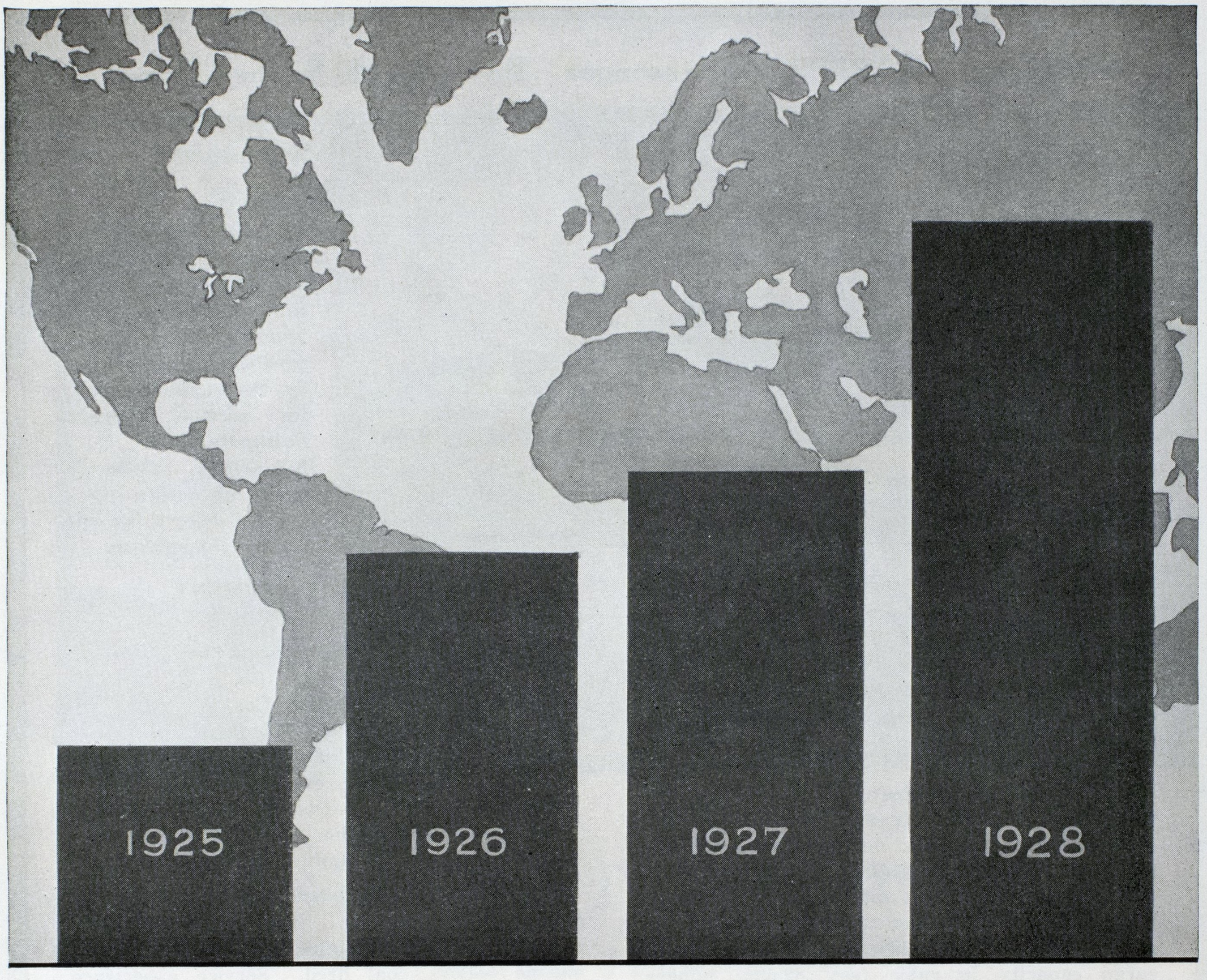
INGERSOLL-RAND COMPANY - 11 BROADWAY - NEW YORK CITY

Branches or distributors in principal cities the world over

For Canada Refer—Canadian Ingersoll-Rand Co., Limited, 10 Phillips Square, Montreal, Quebec

Ingersoll-Rand

73-MOE



GROWTH

1925 New York Harbor sees its first Ellis barge

1926 Ellis System adopted on Great Lakes
Demanded for South America—*Portability!*

1927 Pacific Coast adopts Ellis System

1928 Ellis Barges in service in Asia, Porto Rico, Hawaii and South America

ELLIS CHANNEL SYSTEM

PATENTED

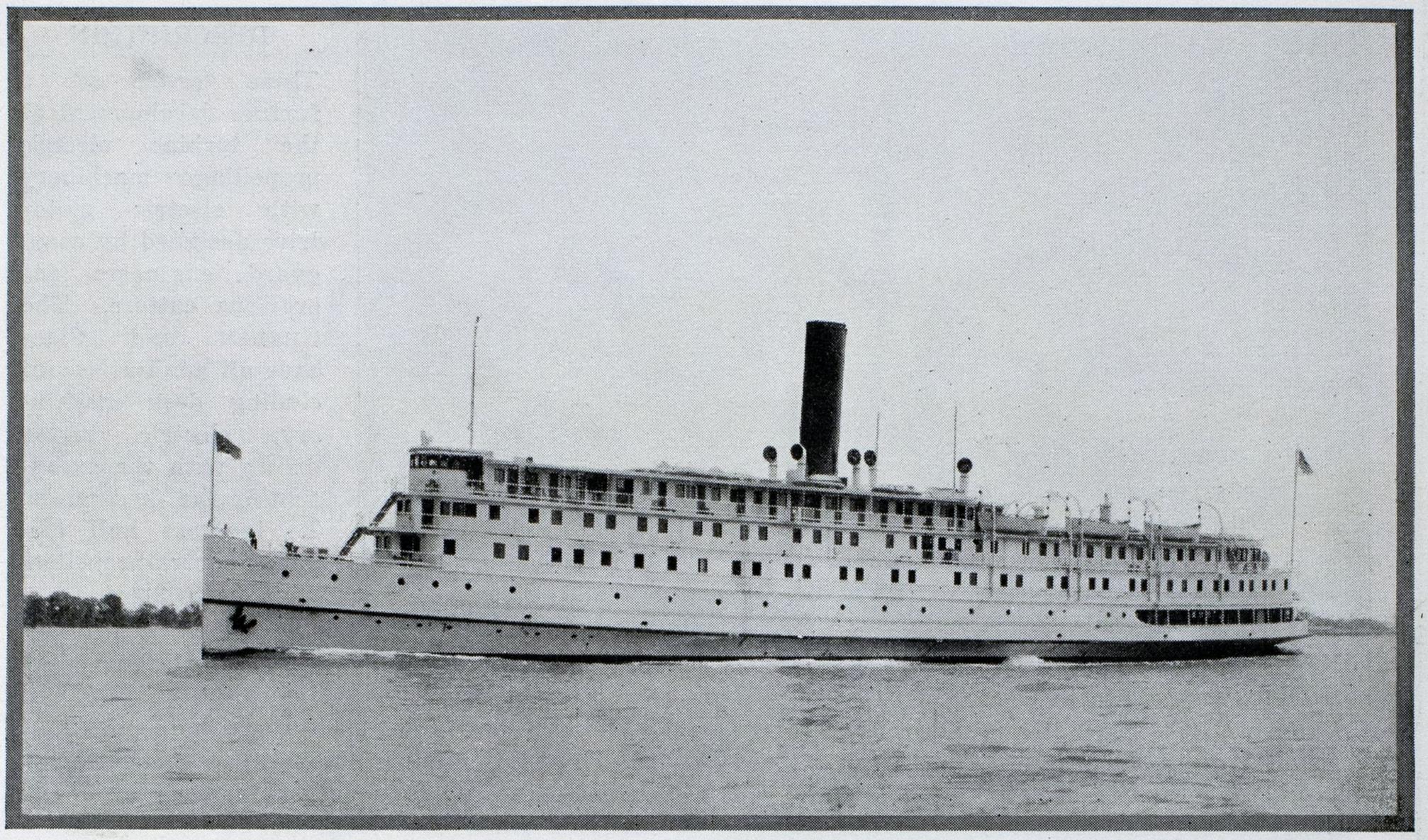
INCORPORATED

Atlantic Division
ATLANTIC ELLIS CHANNEL SYSTEM, INC.
33 Rector St., New York

Pacific Division
ELLIS CHANNEL SYSTEM, INC.
3200 26th Ave. Southwest, Seattle, Wash.

Great Lakes Division
MANITOWOC SHIP BUILDING CORP., INC.
Manitowoc, Wis.

Central & South American Division
FOX BROS. & CO., INC.
33 Rector St., New York



"PRESIDENT WARFIELD"

Launched, February 1928

SISTER SHIP TO

S. S. STATE OF VIRGINIA

S. S. STATE OF MARYLAND

also built and equipped by

THE PUSEY & JONES CORPORATION

Shipbuilders since 1848

WILMINGTON - DELAWARE

Chelan

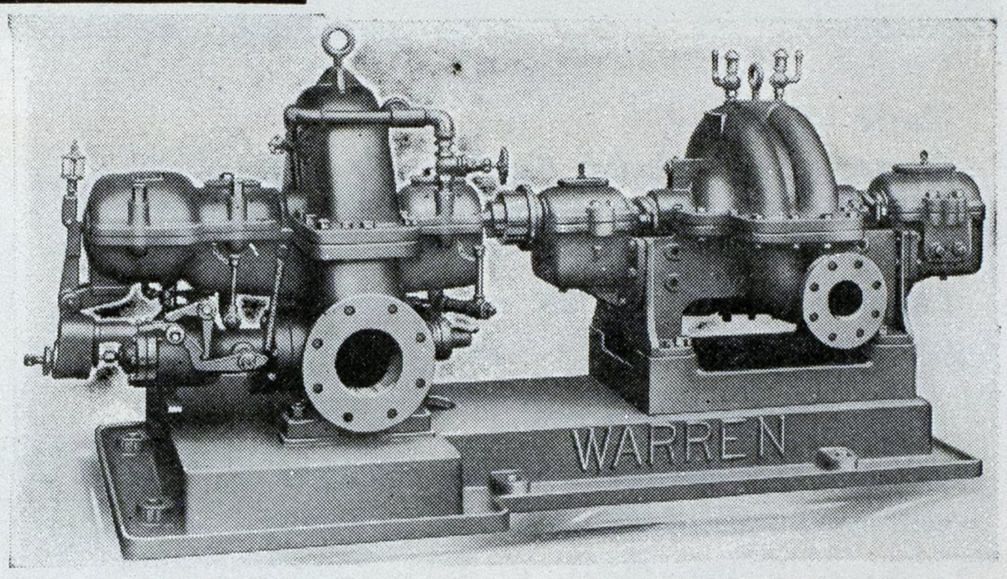
Pontchartrain

Tahoe

Champlain

Mendota

Five new Coast Guard Cutters — each equipped with 8 Warren Pumps



One of 10 two-stage pumps supplied for above vessels; 5 motor driven and 5 driven by Whiton-Lee turbines

BECAUSE of their departure from the usual ship power-plant arrangement, these newest additions to the Coast Guard fleet will be watched with great interest by all shipping circles. Designed to obtain high operating economies, it is significant that Warren Marine Pumps should form an important part of the engineering equipment on each vessel.

Each vessel has the following Warren Pumps:

1 10" x 6" x 24" Vertical Single Main Feed Pump
1 10" x 6" x 24" Vertical Single Auxiliary Feed Pump
1 14" Centrifugal Main Condenser Circulating Pump, motor driven
1 2" Centrifugal, Single Stage, Sanitary Pump, motor driven
1 2" Centrifugal, Single Stage, General Service Pump, motor driven
1 2" Centrifugal, Single Stage, Auxiliary Circulating Pump, motor driven
1 3" Centrifugal, Two Stage, Fire Pump, motor driven
1 3" Centrifugal, Two Stage, Fire Pump, turbine driven

Warren has been in the Coast Guard Service before. The cutter "Northland," which two years ago replaced the "Bear" for duty in the Arctic, is Warren equipped, and the pumps have given efficient, dependable service on every cruise; three pumps were also installed on the "Seneca," recently re-conditioned. Let your next epuipment be Warren. *Write for Bulletins.*

Warren

WARREN

Steam Pump Company Inc.
Warren Engineering Corp., 117 Liberty Street, New York City
M. L. Katzenstein, President

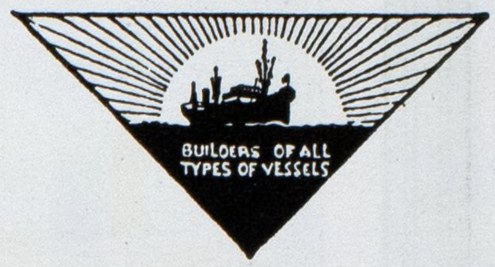
Warren Massachusetts
Western Engineering Company, 215 Market Street, San Francisco, Cal.

SUN SHIPBUILDING & DRY DOCK COMPANY

Builders of

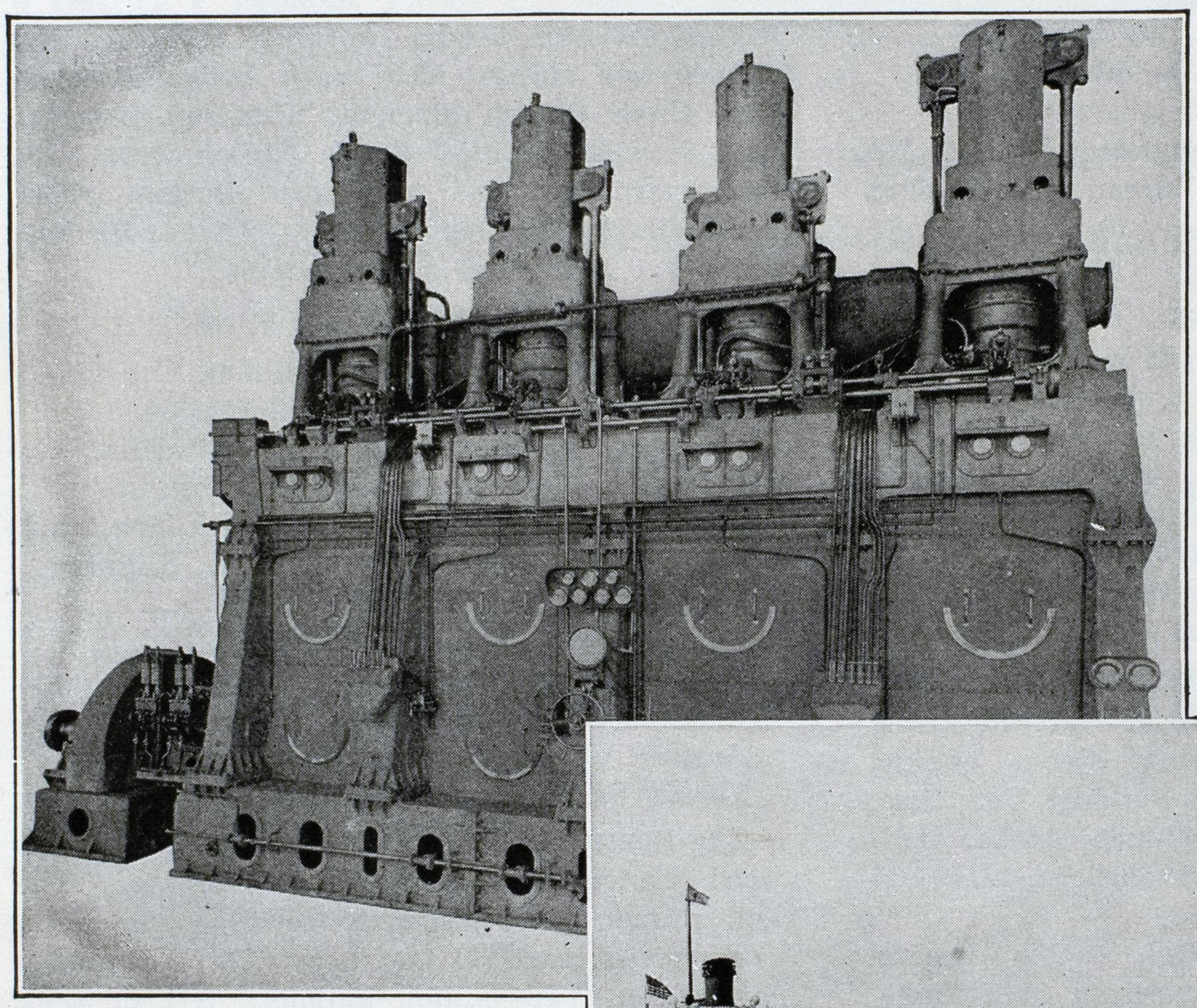


SUN-DOXFORD DIESEL ENGINES



The Engines that Power

"HENRY FORD II" *and* "BENSON FORD"



3000 S. H. P. Sun-Doxford Diesel Engines power the two motorships, "Henry Ford II" and "Benson Ford".



M. S. "Henry Ford II"

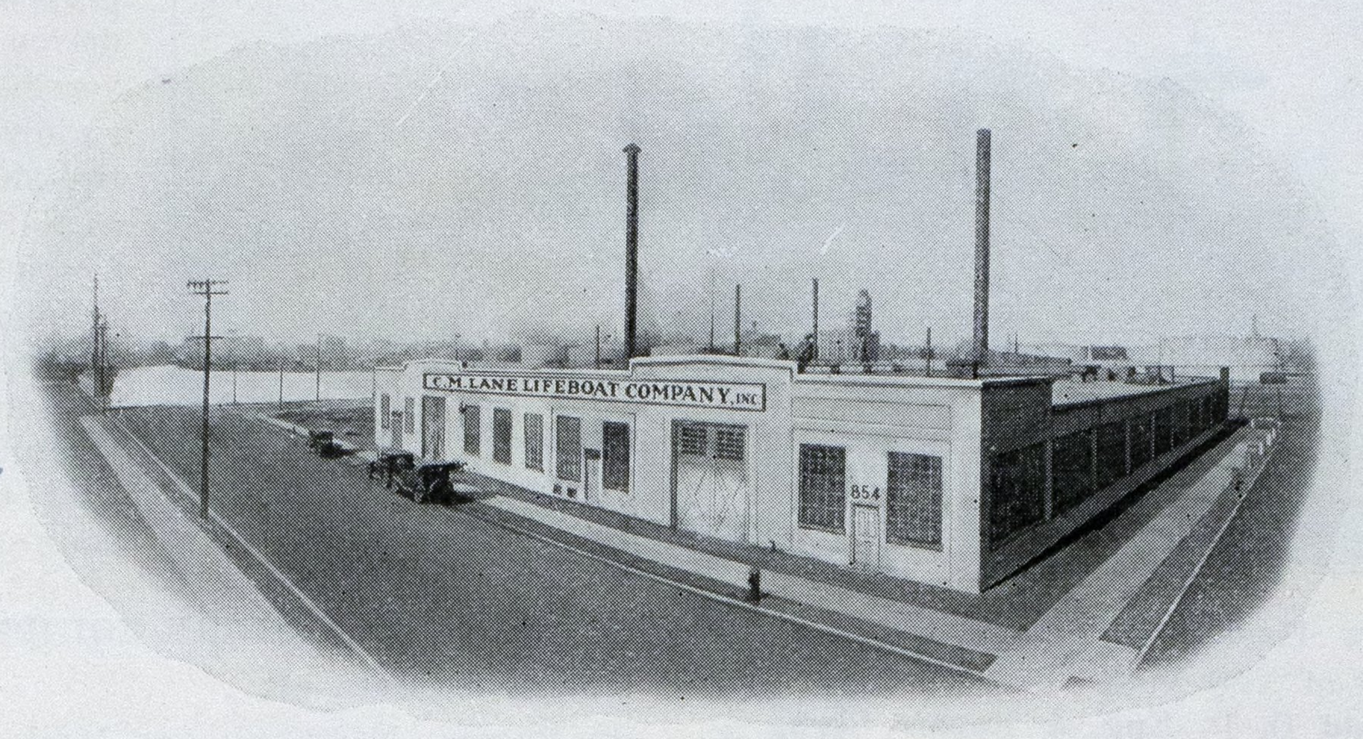
SUN-DOXFORD *and* JUNKERS PATENTS

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LANE LIFE BOATS are built in this modern plant, equipped with the latest machinery for the production of life boats.

Our organization with more than half a century's experience is capable of solving any lifeboat stowage problems.

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Wood or Metal

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Turning Out Gears

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KNOWN THE WORLD OVER
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AGENT FOR
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C. M. Lane Lifeboat Co., Inc.

Specialists in Construction
Lifeboats to BOARD OF TRADE *and other* FOREIGN BUREAUS.

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ERIE FORGINGS

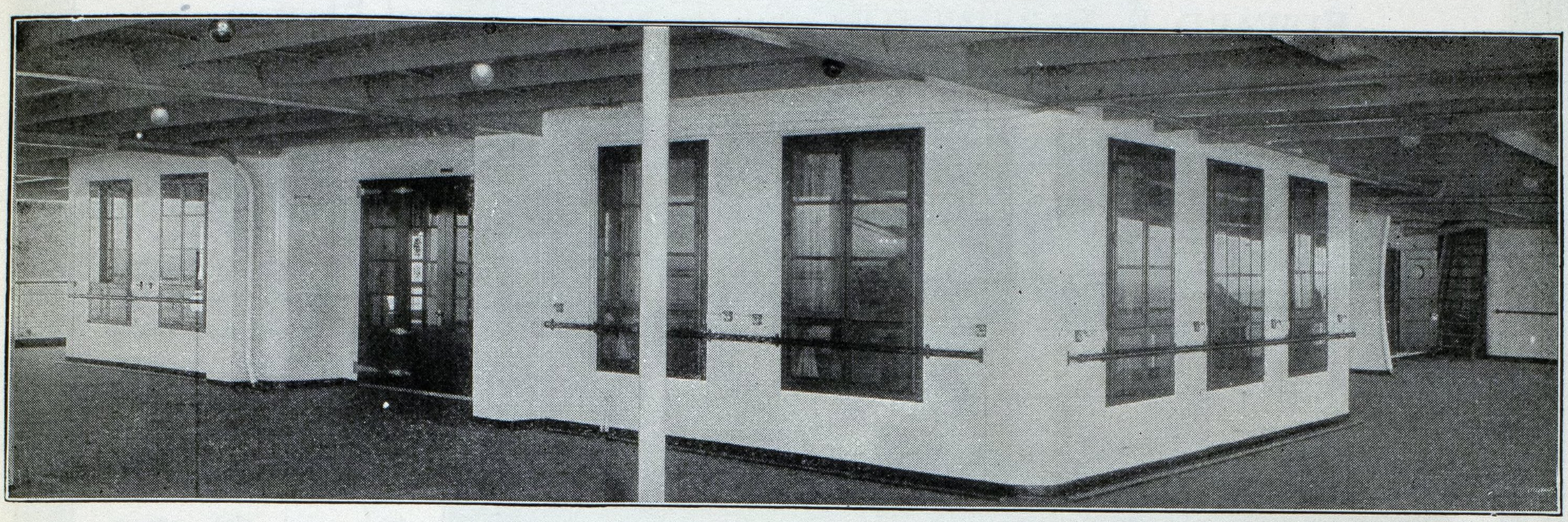
MARINE Forgings for many years have been an important part of our business and our geographical location is such that all customers are assured of the fastest possible forging service.

We also operate a high grade steel Foundry Department in which we are prepared to make castings up to 150,000 lbs. each.

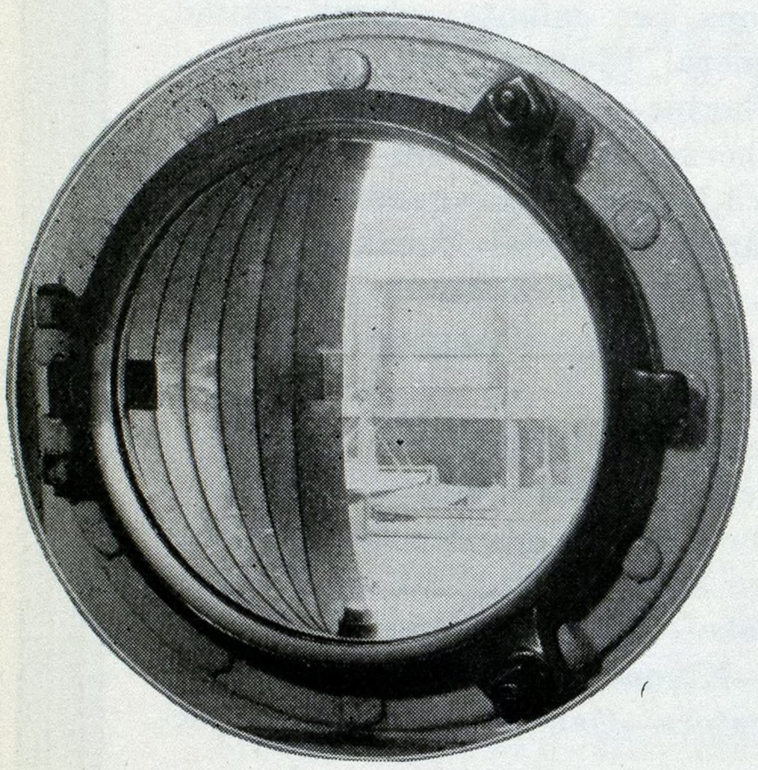
Specialists in Diesel Engine Crankshafts

Erie Forge Company
Erie, Penna.

KEARFOTT WINDOWS



KEARFOTT-KAWNEER CASEMENT WINDOWS ON STEAMSHIP VIRGINIA

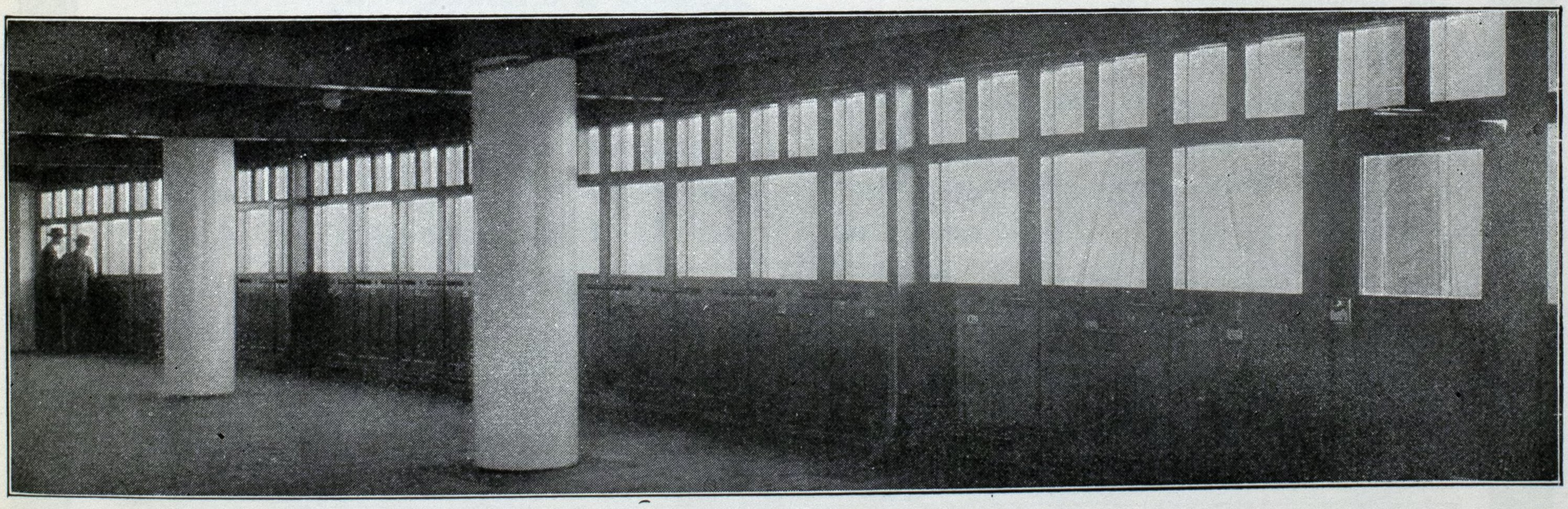


NEW KEARFOTT FOLDING WINDSCOOP

All-bronze Kearfott-Kawneer Casement Windows are fitted in the lounge and veranda cafe of the SS VIRGINIA. Constructed of extruded bronze section—fitted with mirror quality plate—provided with hinged panels that can be opened for ventilation—all combine to make a window of strength, elegance and utility.

Kearfott Folding Windscoops are permanent fixtures in the airports of the dining salon and staterooms.

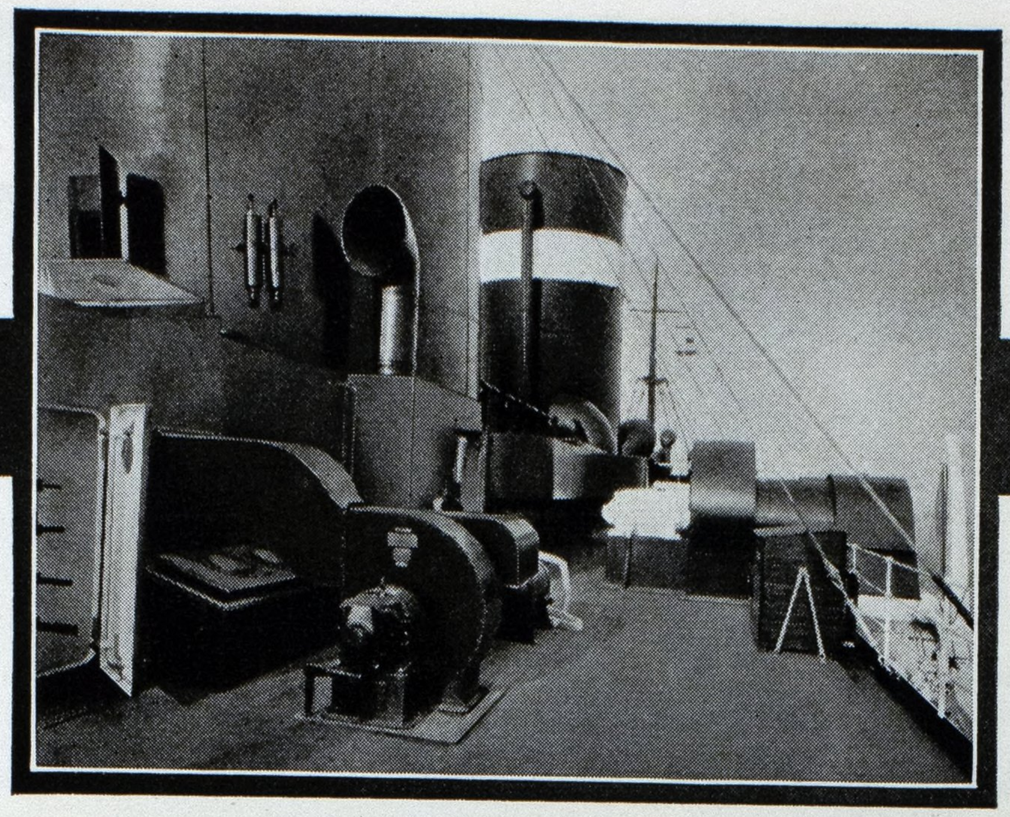
Frameless Windows that are mechanically operated shelter the forward end of the promenade deck.



GLASS ENCLOSED PROMENADE DECK—SS VIRGINIA

KEARFOTT ENGINEERING COMPANY, Inc.

117 LIBERTY STREET NEW YORK



S. S. Virginia, built by Newport News S. B. and D. D. Co., for the Panama Pacific Line, International Mercantile Marine Co. Photo shows Sturtevant Multivane Fans on deck.

Sturtevant Equipment Aboard the S. S. Virginia

Now honors are divided. The S. S. Virginia, Panama Pacific's new liner, like her sister ship S. S. California, is fitted out magnificently. She and her sister ship are the largest steamers built in American yards, and are equipped with turbo-electric propelling machinery. They are splendid examples of modern design and construction, and have many mechanical refinements.

The ventilation for the Virginia is supplied by 27 Sturtevant Multivane Fans. In connection with the refrigerating system four Multivanes are used. In the power plant there are 8 Multivanes, four are installed for main generator cooling and four for supplying forced draft to the boilers. Two Sturtevant C-12 Turbines drive the boiler feed pumps and a Sturtevant Monogram Exhauster is used for gland leak-off.

We welcome opportunities to work with Marine architects and engineers in the selection of equipment that will meet their particular needs.

B. F. STURTEVANT COMPANY

Plants and Office at: **Berkeley, Cal. - Camden, N. J. - Framingham, Mass. - Galt, Ontario, - Hyde Park, Mass. - Sturtevant, Wis.**

Branch Offices at: Atlanta; Birmingham; Boston; Buffalo; Camden; Charlotte; Chicago; Cincinnati; Cleveland; Dallas; Denver; Detroit; Hartford; Indianapolis; Kansas City; Los Angeles; Milwaukee; Minneapolis; New York; Omaha; Pittsburgh; Portland; Rochester; St. Louis; San Francisco; Seattle; Washington, D. C.; *Canadian Offices at:* Toronto, Montreal and Galt.
Canadian Representative: Kipp Kelly, Ltd., Winnipeg. *Also Agents in Principal Foreign Countries.*

Sturtevant REG. U. S. PAT. OFF. *Marine Equipment*

SHIPBUILDING AND REPAIRS



The Staten Island Plant of United Dry Docks, Inc.

One of the six well-equipped plants of United Dry Docks, Inc.

The company operates, under one management, with consequent economy, increased efficiency and wider scope of service to its clients, the plants formerly owned by

Theo. A. Crane & Sons Company
W. & A. Fletcher Company
Morse Dry Dock & Repair Company
New York Harbor Dry Dock Company
James A. Shewan & Sons Company, Inc.
Staten Island Shipbuilding Company

Customers who prefer to deal with the yard they have become accustomed to will find the same personnel ready to meet their individual requirements.

The Staten Island Plant, located at Mariners Harbor, Staten Island, New York City, has been known as a successful shipbuilding and marine engine plant for more than 30 years. It offers unusual facilities for the following types of work:

Shipbuilding and Repairs

Ferry boats, tugboats, yachts, barges, etc. The "Dongan Hills" just launched, the largest and fastest ferry boat in New York, with engines of 4000 H.P., is its 781st hull. Builders of many famous yachts.

Marine Engines

Designers and builders of all types of marine engines. Has built five large Diesel electric tugs in the past two years.

Boilers

The boiler shop is fitted to build marine boilers of all sizes and types.

Foundry Work

The foundry is modern, making castings up to 20 tons, and is equipped to give 24-hour service on marine castings of any kind, in brass or gray iron.

Tanks

Special equipment for building all types of tanks. Will contract for any kind of special work.

A company car meets all trains at the Arlington Station of the Staten Island Rapid Transit.

UNITED DRY DOCKS

INCORPORATED

11 Broadway New York

Here's Where Manitowoc Ships Are Built—



Manitowoc Shipbuilding Corporation Plant

NO matter what your requirements may be, we can serve you. Here you will find a modern shipbuilding plant with an experienced organization—prepared to design and build steel ships ranging from tugs and yachts to car ferries, freighters and passenger vessels.

THEN, too, we are ready to convert, recondition and repair ships quickly and economically. Our repair facilities for hull, engine and boiler work are available for you—night and day.

Designers and builders of all types of Steam, Diesel and Diesel Electric propelled equipment, as follows:

- Freight Vessels
- Passenger Vessels
- Self-unloaders
- Car-Ferries
- Suction Dredges
- Pleasure Yachts
- Fire Boats
- Dipper Dredges
- Sandsuckers
- Dump Scows
- Barges
- Tugs
- Car Floats
- Pontoons

We also design and build:

- Boilers
- Marine Engines
- Steering Engines
- Windlasses
- Winches
- Gypsies
- Hawser Reels
- Chocks
- Fairleads
- Towing Bitts

MANITOWOC SHIPBUILDING CORPORATION
Manitowoc **Wisconsin**

MANITOWOC

COEN Combustion Engineers

COEN—*Burners*
—*Heaters*
—*Strainers*
—*Pumping Sets*
—*Accessories*

in successful operation on land and sea.

For Engineering Data on

PULVERIZED FUEL AND OIL BURNING EQUIPMENT

WRITE

COEN COMPANY, INC.

LOS ANGELES
428 Story Bldg.

SAN FRANCISCO
112 Market St.

NEW YORK
50 Church St.

SHIPBUILDING

SPEAR-IT

LOW COST

GOOD WORK

QUICK DELIVERY

The SPEAR ENGINEERS, *Inc.*

Naval Architects & Shipbuilders

NORFOLK, VIRGINIA

Plant No. 1 Portsmouth, Va.

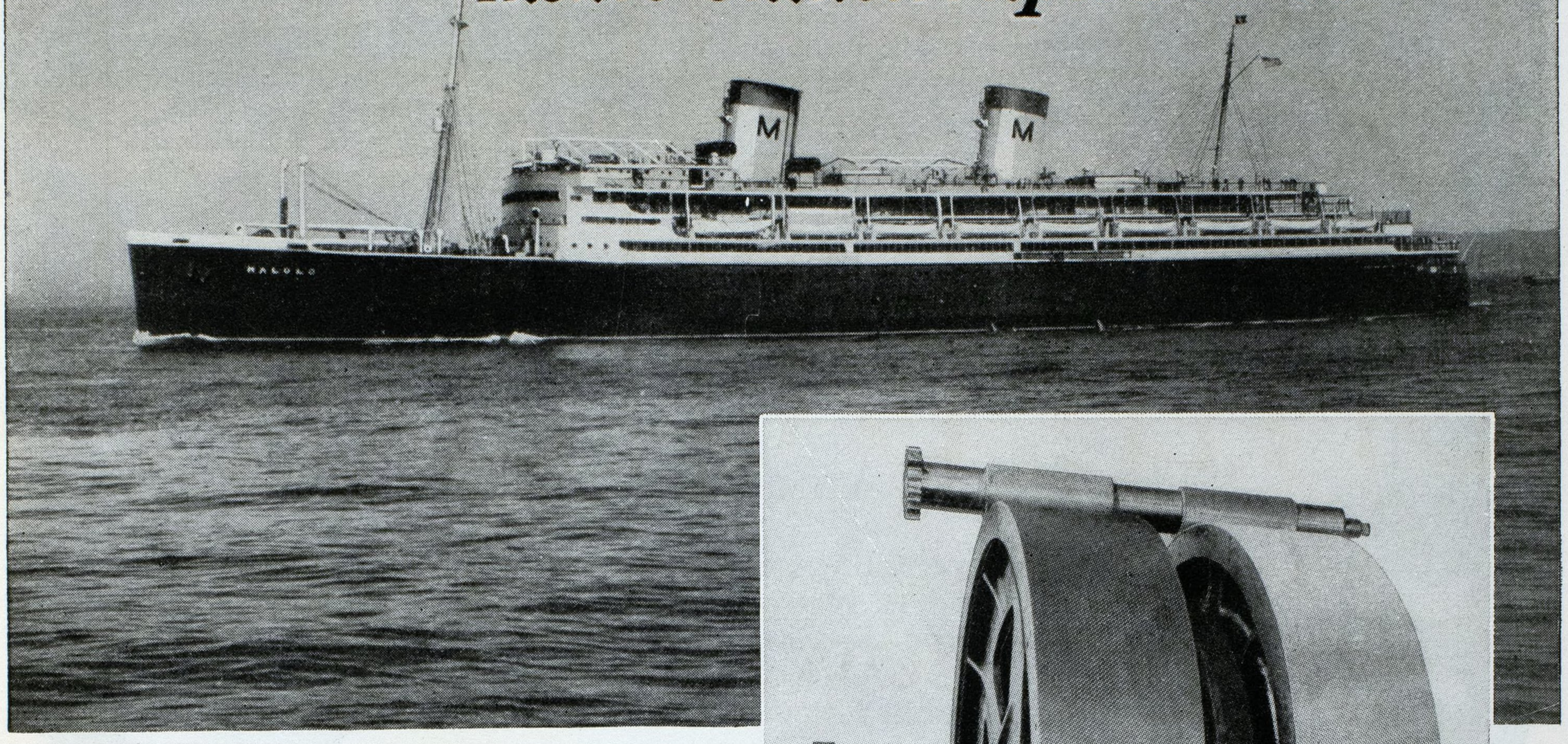
Plant No. 2 West Norfolk, Va.

Offices:

300-307 Bankers Trust Bldg., Norfolk, Va.

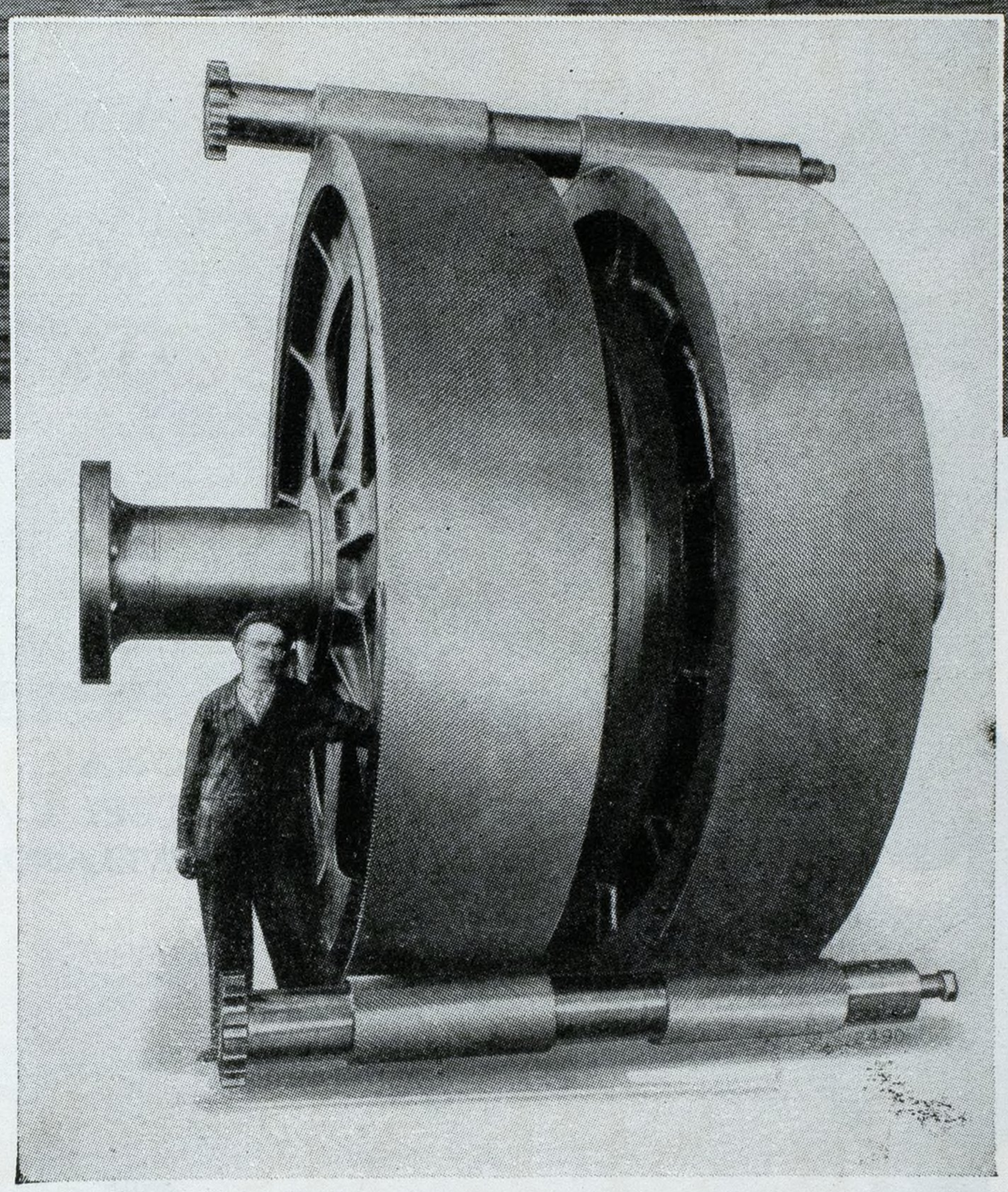
De Laval Marine Gears

Insure Uninterrupted Service



THE Matson liner MALOLO, shown above leaving San Francisco Harbor through the Golden Gate, recently completed 12 months' service or 26 round trips to Hawaii, aggregating 110,000 miles at an average speed of approximately 21 knots in all weathers.

The regularity of her schedule demonstrates the reliability of her propelling equipment, which includes four De Laval two pinion, single reduction gears transmitting a total of 25,000 hp. These gears have a pitch diameter of 141 inches and a total width of working face of 57 inches.



De Laval propelling equipment insures lowest cost and greatest reliability. Ask our engineers for recommendations and guarantees on De Laval turbines and gears for that vessel which you are planning.

De Laval Steam Turbine Co.

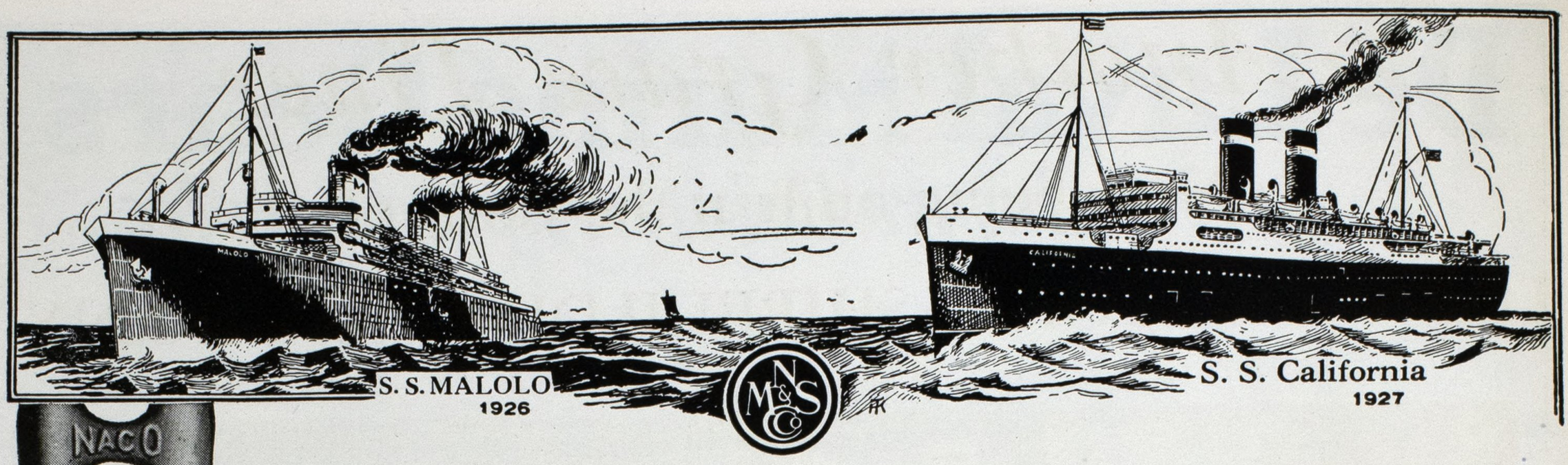
Trenton, New Jersey

LOCAL OFFICES

Atlanta, Boston, Charlotte, Chicago, Cleveland, Duluth, Havana, Helena, Honolulu, Houston, Kansas City, Los Angeles, Montreal, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Paul, Salt Lake City, San Francisco, Seattle, Spokane, Toronto, Vancouver

2002

Manufacturers of Steam Turbines, Centrifugal Pumps, Centrifugal Blowers and Compressors, Double Helical Speed Reducing Gears, Worm Gears, Hydraulic Turbines, Flexible Couplings and Special Centrifugal Machinery





NACO Anchor Chain

is again chosen for "The largest American built merchant vessel"

THIS magnificent liner, S. S. Virginia, just completed at Newport News for The Panama Pacific Line, is equipped with 335 fathoms of 3⅛" NACO Cast Steel Anchor Chain, proof tested to more than half a million pounds.

NACO Anchor Chain is made of Naco Steel, the strongest material ever used in Anchor chain construction, by the most modern method of chain manufacture.



NACO Anchor Chain Links are absolutely uniform in size and shape and are made in one piece, free from welds.

NATIONAL
MALLEABLE AND STEEL CASTINGS CO.
General Office—CLEVELAND, OHIO



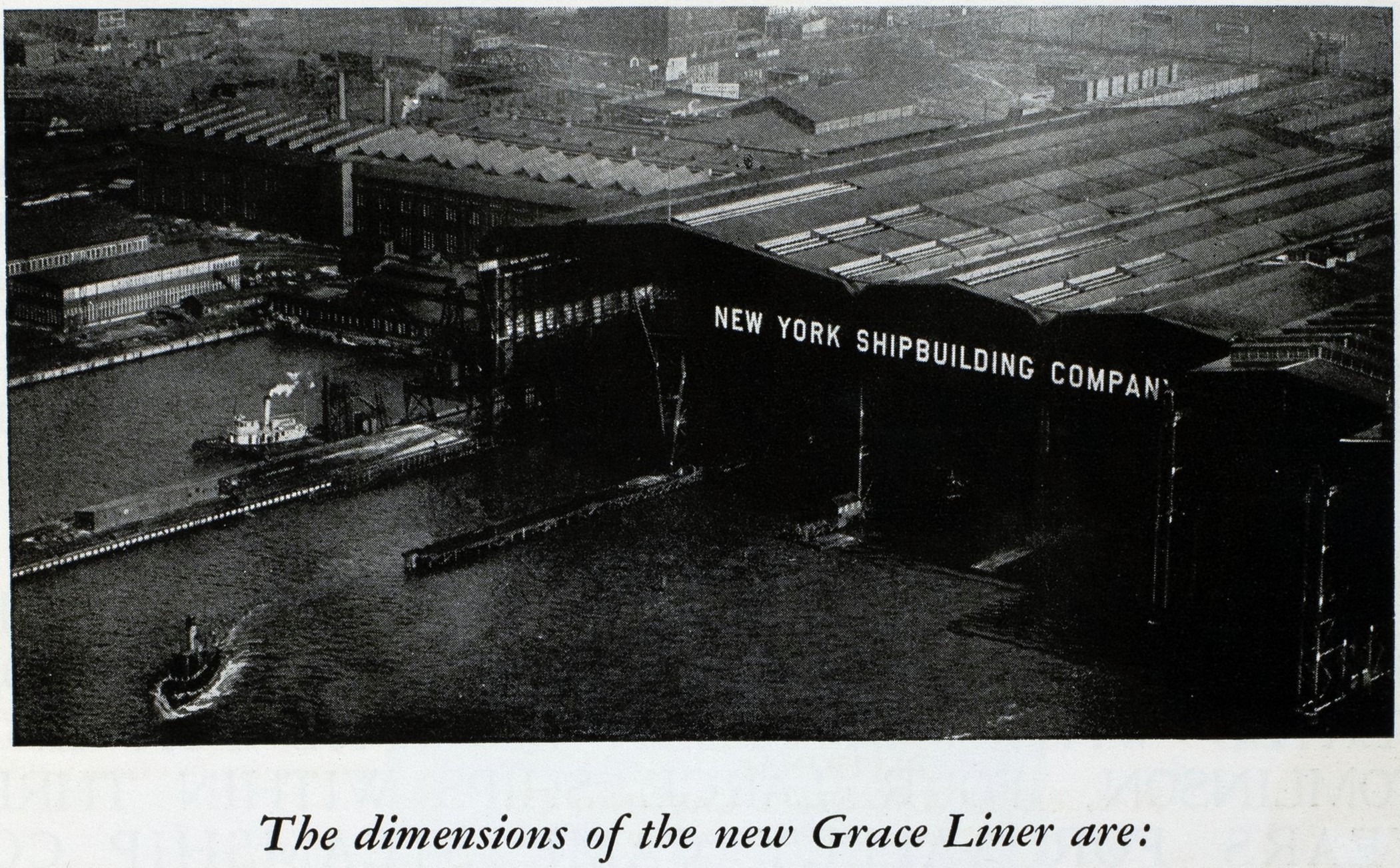
NACO CAST STEEL CHAIN
The Strongest Chain Made

TRADE MARK

Another Grace Liner

Now being built at the yards of

THE NEW YORK SHIPBUILDING COMPANY



The dimensions of the new Grace Liner are:

Gross Tonnage	10,500	Draft	25'0
Net Tonnage	6,300	S. H. P.	12,000
Length Overall	505'0	Speed	18 Knots
Beam	63'9	Drive	Turbo-Electric
Depth	37'5	Passenger Accommodations	165 First Class

The New York Shipbuilding Company also built the S. S. Santa Leonora and S. S. Santa Eliza for the Grace Line

The N. Y. Shipbuilding Co. recently completed the U. S. S. Saratoga the fastest capital ship afloat, also recently launched the U. S. S. Salt Lake City and has under construction a sister ship, the U. S. S. Chester.

THE Organization and facilities at this Delaware River Shipyard afford the private ship owners of America the prompt delivery of vessels designed especially to meet the particular needs of their service.

NEW YORK SHIPBUILDING CO.

General Office and Works
CAMDEN, N. J.

New York Office
420 LEXINGTON AVENUE

THE

LEATHEM D. SMITH SYSTEM FOR NEW OR CONVERTED SELF-UNLOADING SHIPS

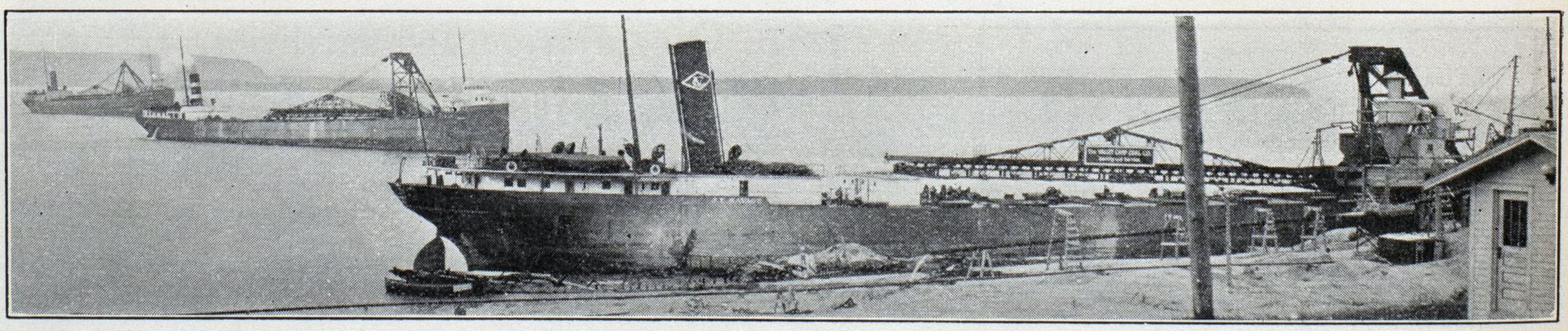
— AND —

BULK STORAGE RECLAMATION

THRU SPECIALLY PATENTED DEVICES OF LEATHEM D. SMITH IT IS MADE POSSIBLE TO RECONVERT STANDARD LAKE AND SEA GOING BULK FREIGHTERS INTO SELF-UNLOADERS TO HANDLE ALL CLASSES OF BULK MATERIAL SUCH AS COAL, STONE, PUMPED SAND ORE, GYPSUM, BULK CEMENT, SALT, A LARGER RANGE OF MATERIAL THAN HANDLED BY ANY OTHER SYSTEM. WE NOW HAVE SIXTEEN BOATS IN OPERATION AND FIVE UNDER CONSTRUCTION AT THIS TIME, WITH THIS DEVICE, RANGING FROM 2000 TO 10,000 TONS. WE ALSO SPECIALIZE IN THE DESIGNING OF SELF-UNLOADING RIVER BOATS.

REPEAT ORDERS FROM SATISFIED CUSTOMERS OUR BEST TESTIMONIAL. FOUR LARGE SHIPS CONVERTED WITHIN SIXTEEN MONTHS FOR G. A. TOMLINSON, FOUR LARGE SHIPS WITHIN THREE YEARS FOR VALLEY CAMP STEAMSHIP CO., BOTH CLEVELAND, OHIO.

WE SOLICIT YOUR INQUIRIES CONCERNING ANY OF YOUR WATER TRANSPORTATION AND ALSO DOCK STORAGE AND RECLAMATION PROBLEMS.



Three converted ships with our system awaiting cargo at loading dock

LEATHEM D. SMITH DOCK CO.

PLANT LOCATION
STURGEON BAY, WIS.

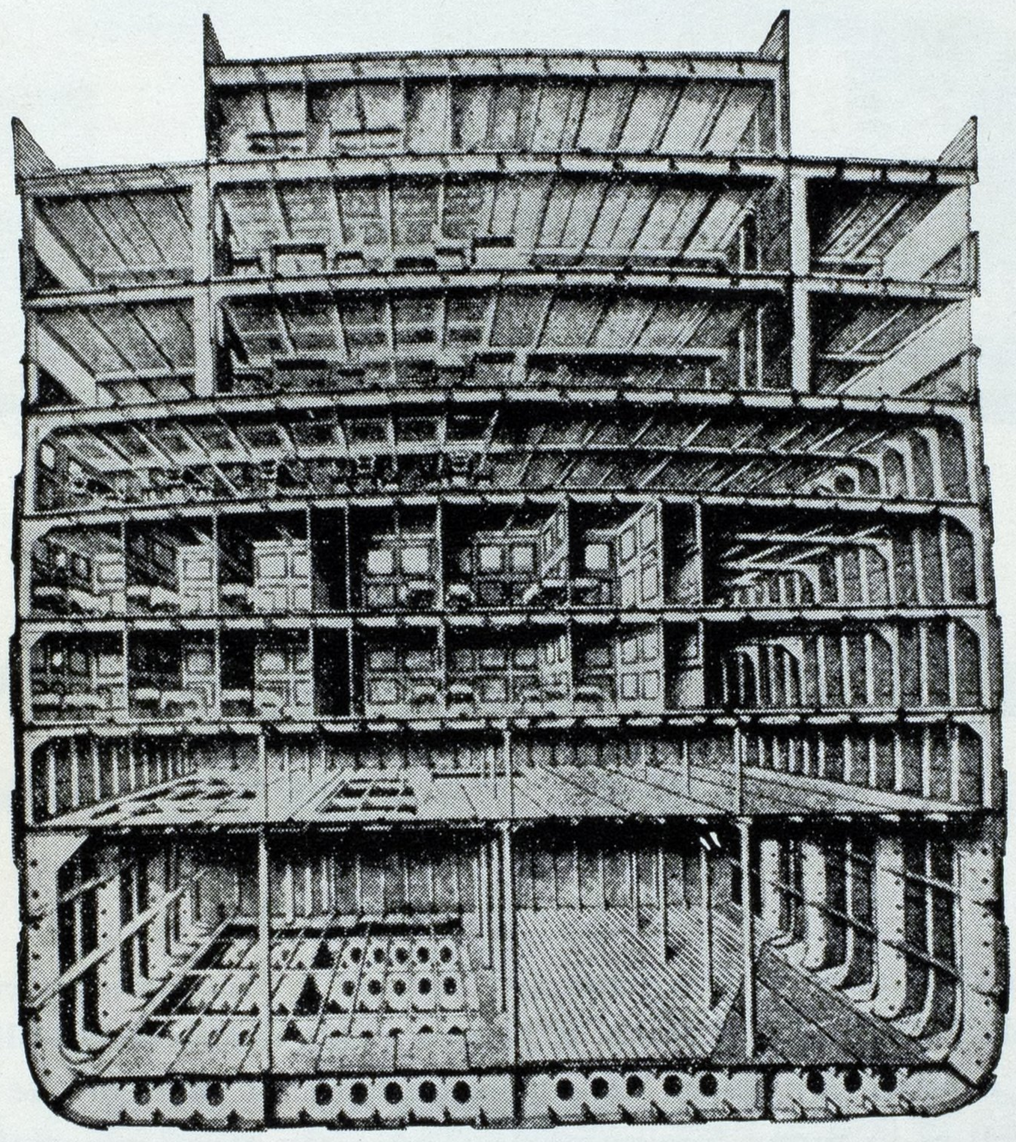
ENGINEERING OFFICE: 205 W. WACKER DRIVE
1407 ENGINEERING BLDG., CHICAGO

ISHERWOOD
COMBINATION SYSTEM

(Incorporating The Miller System Patents now owned by us.)

FOR

PASSENGER LINERS



Design of 760 ft. Passenger Liner on the Isherwood Combination System.

The Isherwood Combination System is more economical and advantageous than the ordinary construction and provides for a stronger and more endurable vessel.

SIR JOSEPH W. ISHERWOOD & CO. Ltd.

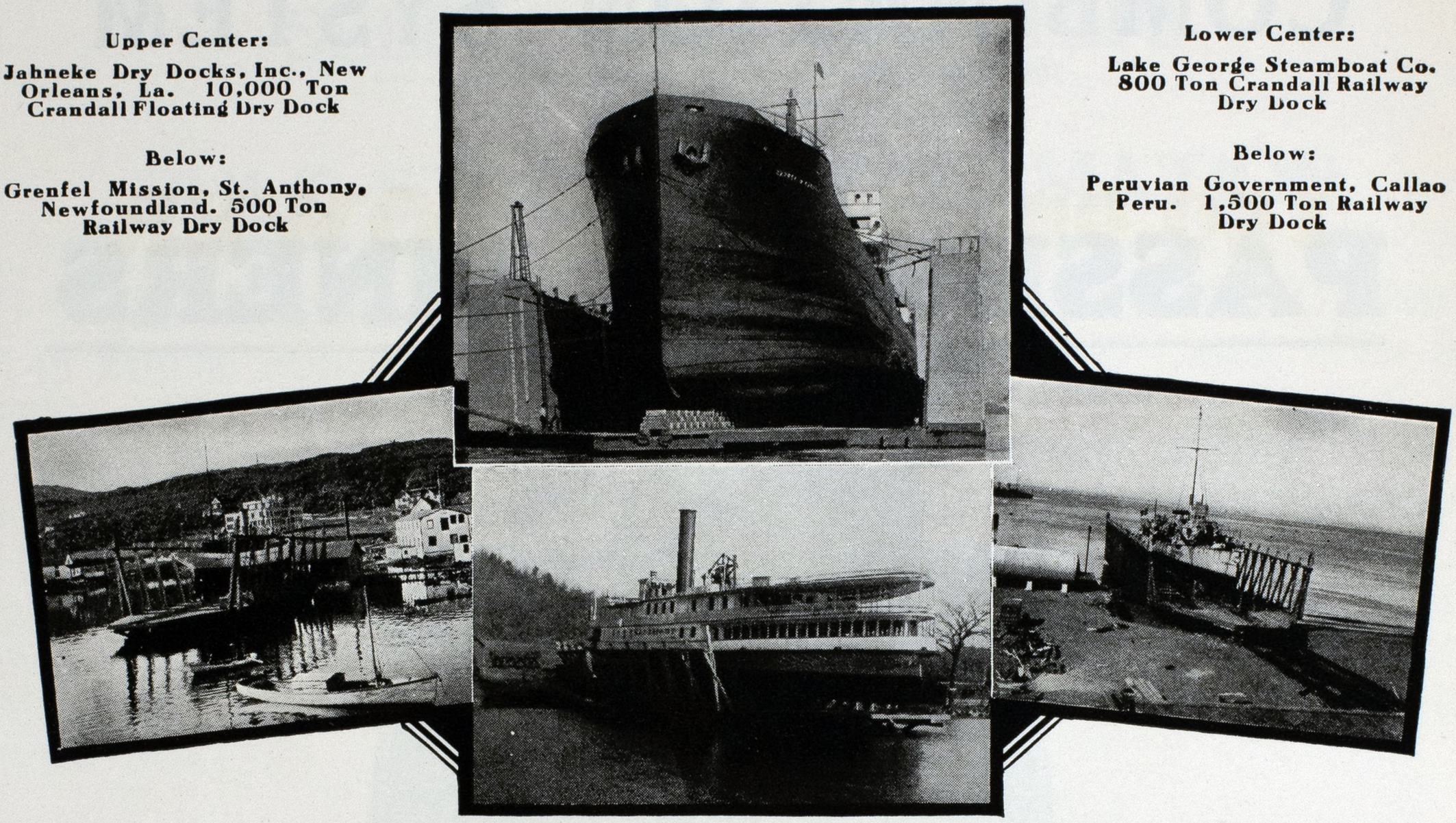
17 Battery Place, NEW YORK

Upper Center:

Jahneke Dry Docks, Inc., New Orleans, La. 10,000 Ton Crandall Floating Dry Dock

Below:

Grenfel Mission, St. Anthony, Newfoundland. 500 Ton Railway Dry Dock



Lower Center:

Lake George Steamboat Co. 800 Ton Crandall Railway Dry Dock

Below:

Peruvian Government, Callao Peru. 1,500 Ton Railway Dry Dock

Standard for Seventy-five Years

1854 ▲ ▲ 1929

In 1854, seventy five years ago, Horace I. Crandall, an engineer of the old school, built the first Crandall Railway Dry Dock at Boston. This dry dock is still in operation. During these 75 years, Crandall Dry Docks have been built in all parts of the United States and Canada as well as in many foreign ports. Today the third generation of engineers with this long experience and tradition as a background is carrying on the work of the founder. Crandall Floating Dry Docks, Railway Dry Docks and Yacht Railways are today known as standard. They have become established as being the product of long dry dock building experience, traditional craftsmanship and efficient engineering.

▲ ▲ ▲ ALL TYPES OF DRY DOCKS ▲ ▲ ▲

THE

CRANDALL

ENGINEERING COMPANY

Cambridge, Massachusetts

SIGNIFICANT

150,000 HORSE POWER

In Service and Under Construction

of

M.A.N. DOUBLE ACTING

TWO-CYCLE MARINE DIESEL ENGINES

With Cylinder Size 27½" Bore by 47¼" Stroke

11,900 HORSE POWER

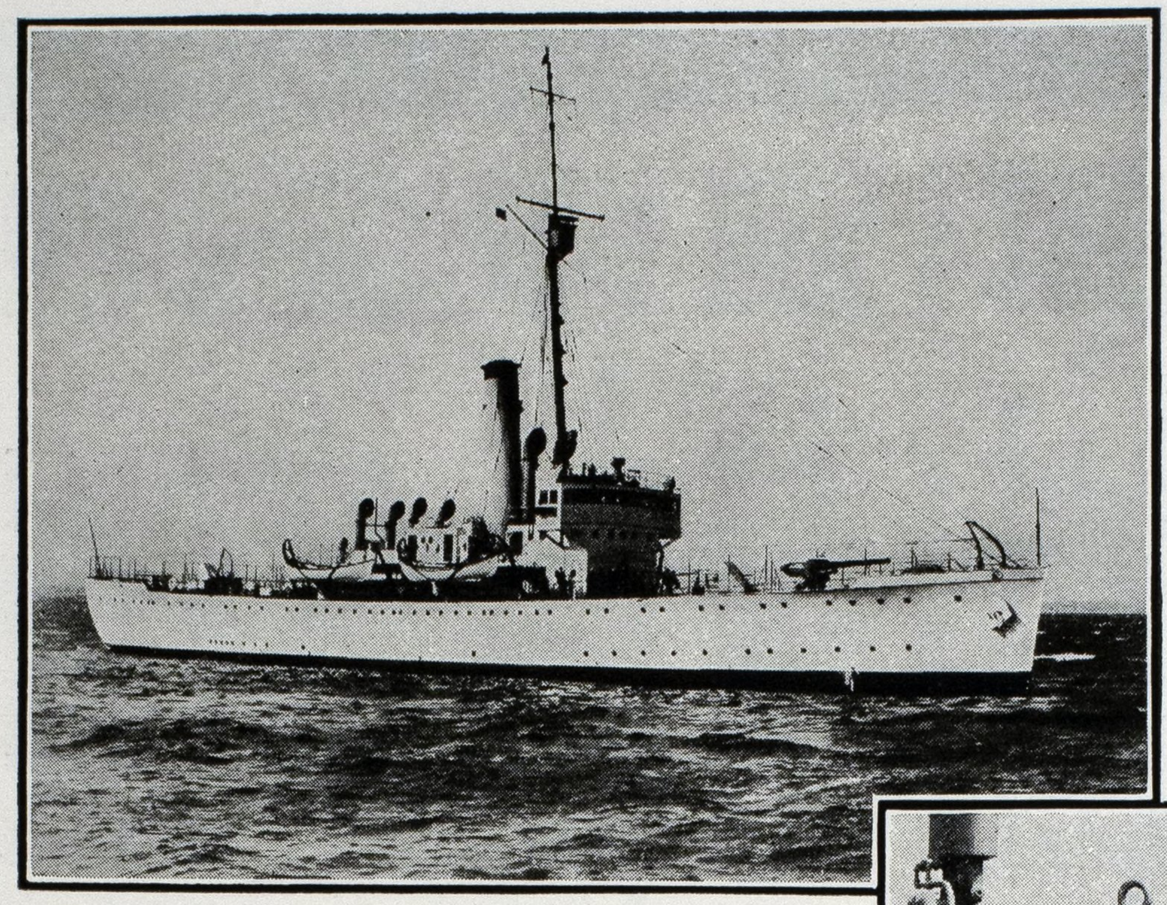
BUILT BY

The Hooven, Owens, Rentschler Co.

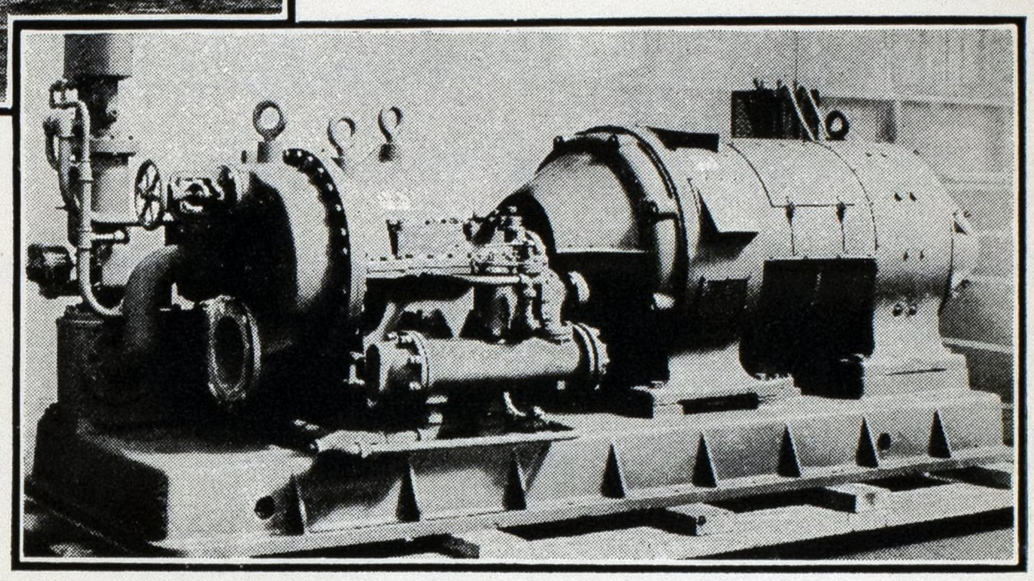
Division General Machinery Corporation of Delaware

HAMILTON, OHIO

HAMILTON M.A.N. Diesel



The turbine electric Coast Guard cutter Chelan.

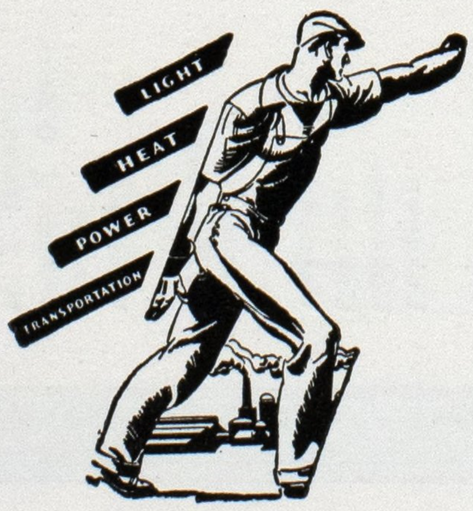


The 3-unit dual drive set, "heart" of the auxiliary power system.

A SEAGOING Central Power Station *with* Turbine Electric Drive

THE economy of the central power station, that long-sought goal of marine engineers, has finally been attained. In the five new turbine electric Coast Guard cutters, Chelan, Tahoe, Mendota, Pontchartrain, and Champlain, the application of the central power plant system, whereby auxiliary power is generated at the economy of the main turbo-generator, has resulted in a saving in total fuel consumption of more than 7 per cent. The complete propulsion machinery, as well as the motors and control of the electrified auxiliaries of all of these vessels, was supplied by Westinghouse.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, EAST PITTSBURGH, PENNA.
SALES OFFICES IN ALL PRINCIPAL AMERICAN CITIES SERVICE STATIONS IN ALL PRINCIPAL AMERICAN PORTS



Westinghouse

Marine Apparatus

T 30431

Auxiliary Motors and Control
Condensers
Diesel Electric Propulsion
Electric Cooking Appliances
Electric Ovens and Ranges
Electric Wall Heaters
Fans
Geared Turbine Propulsion
Switchboards
Turbine Electric Propulsion

Shipbuilding and Repairing facilities unsurpassed in America



NN
TRADE MARK

FOUNDRIES
FORGES
JOINER SHOP
3
LARGE
GRAVING
DOCKS

Here ships are completely overhauled and refitted at the same time

RESOURCES, capacity, experience and facilities are found here in a combination which develops the highest efficiency in the building, converting and repairing of ships.

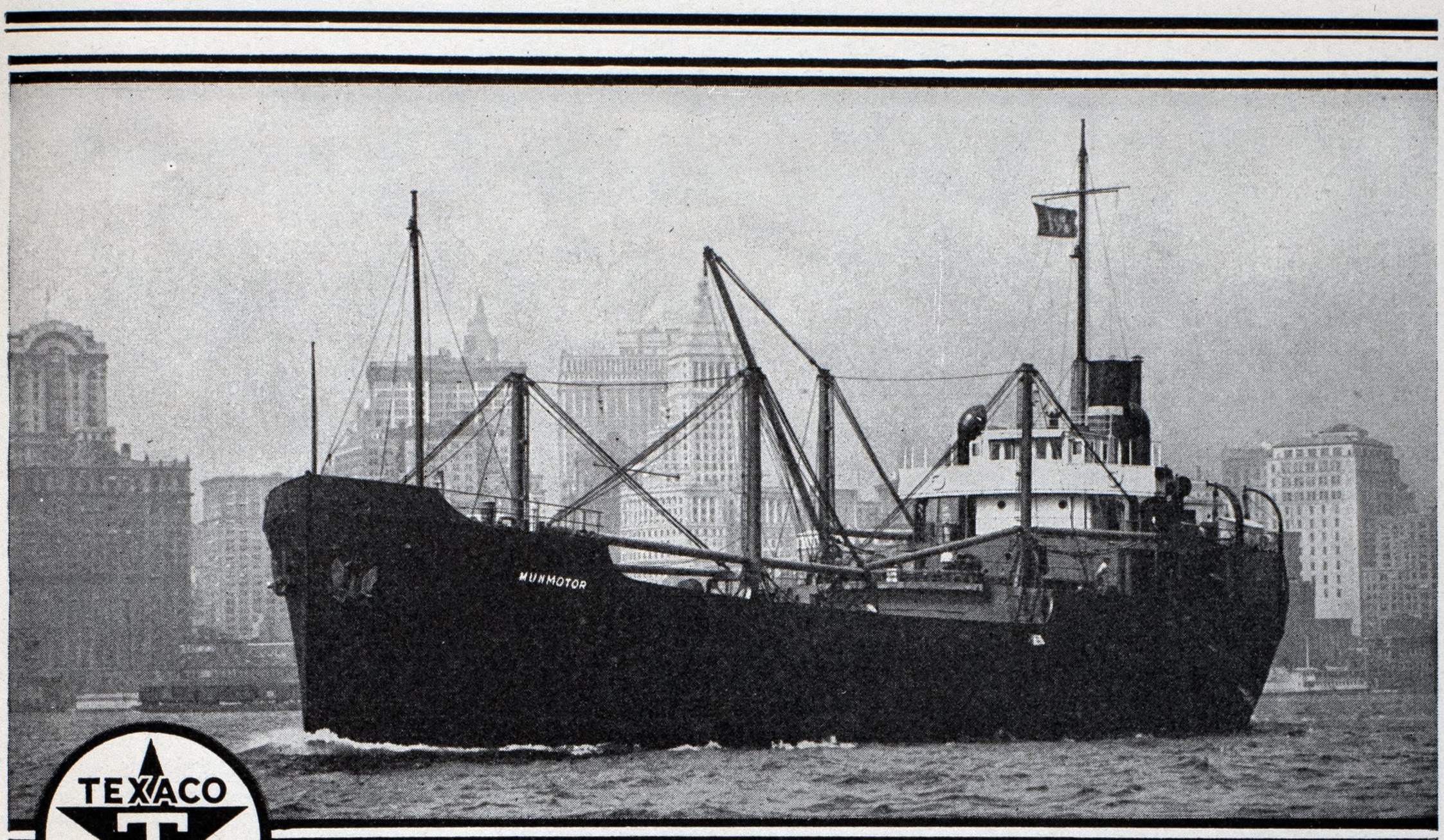
In the final analysis, it is the proven economy, consistently demonstrated in all classes of work which has placed this organization at the head of preferred shipyards.

Every detail of construction, inspection and test are performed with an accuracy and thoroughness that insure maximum ship safety and operating economy.

Marine Paints of Every Description Including Newport News Composition Anti-Corrosive and Anti-Fouling.

Newport News Shipbuilding and Drydock Co.

Newport News, Virginia *223 Broadway, New York City*



TEXACO
REG. U.S. PAT. OFF.

The M. S. "Munmotor," owned and operated by the Munson Line—4125 d.w.t.—is powered by a McIntosh and Seymour 4 cycle, 6 cylinder Diesel Engine of 925 S.H.P. This engine has been lubricated since 1923 with Texaco Ursa Oil.

1923 - 1924 - 1925 - 1926 - 1927 - 1928 —and TODAY

In 1923 Texaco Ursa Oil was selected as the *one* oil most perfectly adapted for lubricating the Diesel Engine of the Motor Ship "Munmotor."

Texaco Ursa Oil is also the *one* Diesel lubricant on the sister ship "Muncove"—both **Munson Line** vessels.

The continued fine performance of Texaco Ursa Oil has proved the wisdom of this choice. Texaco Ursa Oil is still the *one* lubricant. Its clear golden color is the visible indication of its purity. Its full golden body—the exact viscosity required—effectively maintains compression and withstands the heaviest bearing pressures.

Texaco Ursa Oil is pure—a straight unblended mineral oil. It burns cleanly and lubricates thoroughly.

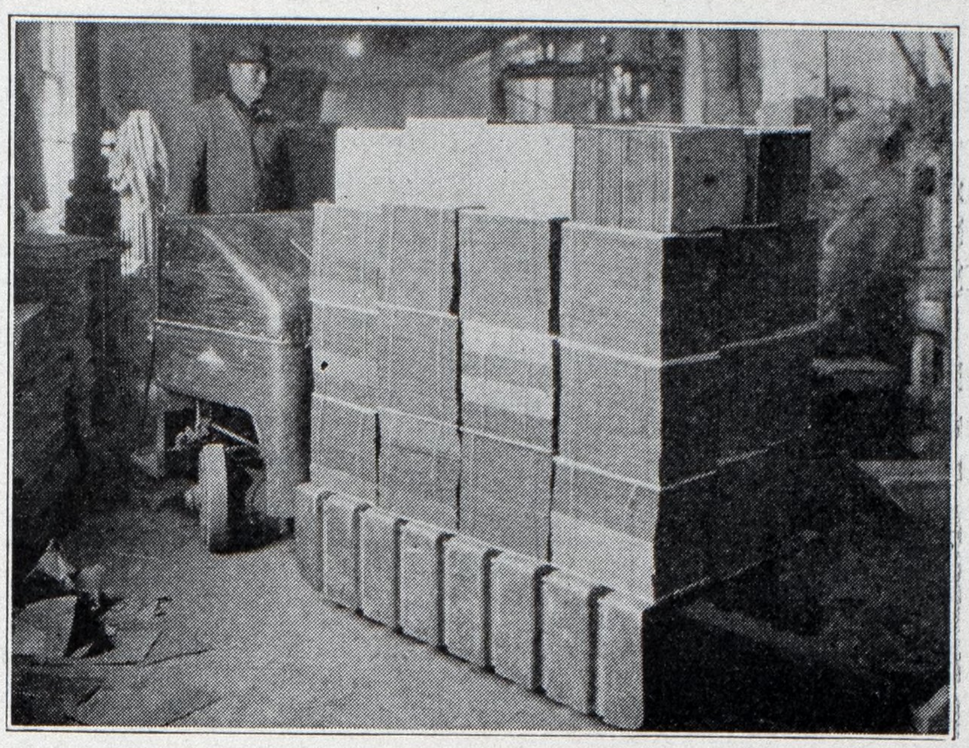
Texaco Marine Lubricants and Texaco Marine Engineering Service are available everywhere. Complete stocks are kept at ports throughout the world. The Texas Company's specialists stand ready to give you the fullest co-operation.

TEXACO LUBRICANTS

The Texas Company, 17 Battery Place, New York City
Marine Sales Division
Offices in Principal Cities

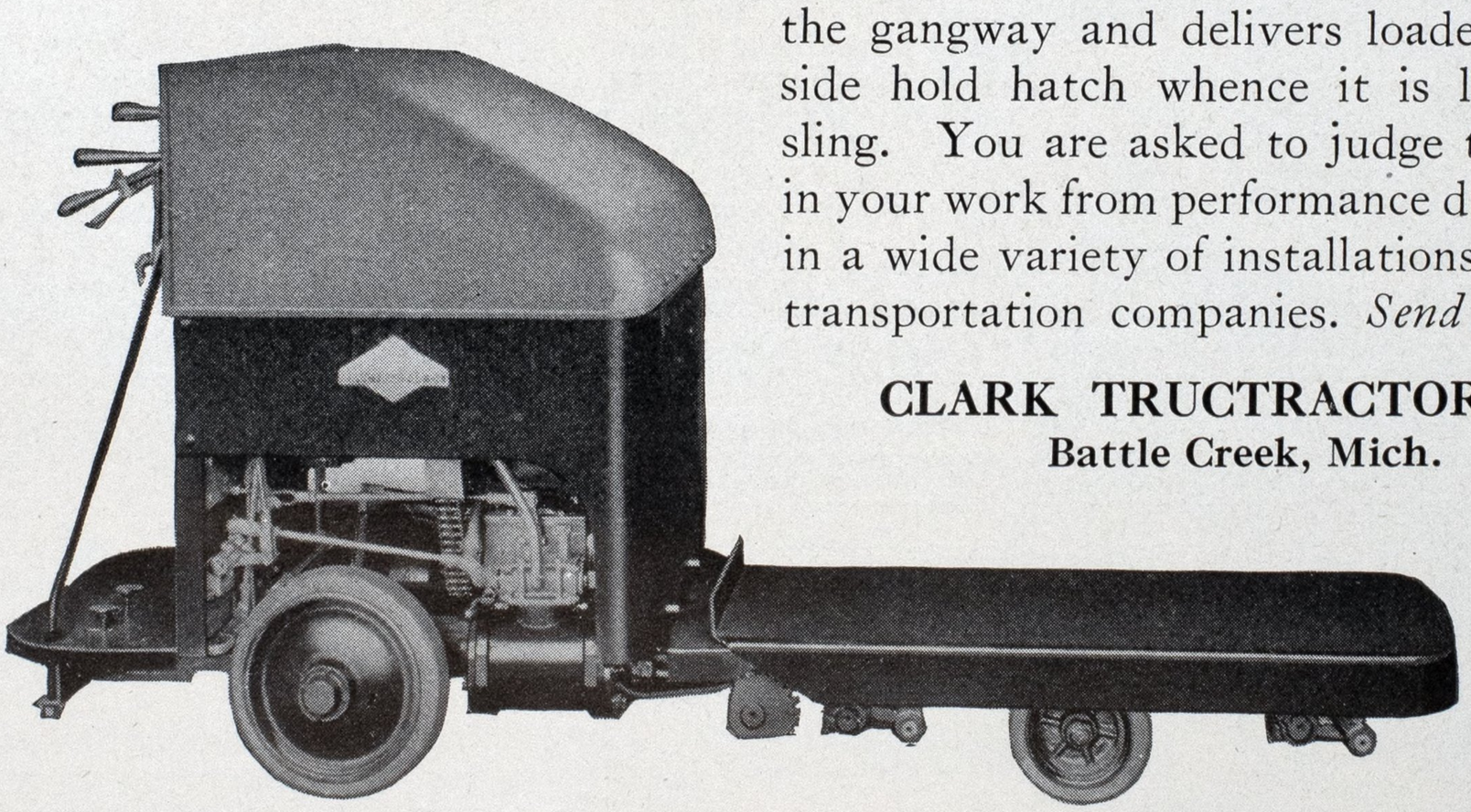
THERE IS A TEXACO LUBRICANT FOR EVERY PURPOSE

Cutting Costs Ashore and Afloat *with this* Gas Powered SEA GOING LIFT TRUCK



An extra handling operation is saved when Clark Truclifts carry cargo directly over the gang plank into the holds of ships at dock. This economy of time is only an additional economy, for the history of Clark Truclifts throughout industry has been one of consistent savings. If cargo is to be carried 'tween decks Clark Truclift puts loaded skid "on the spot".

Clark Truclifts pick up loaded skids inside freight cars, from bunch piles or on the receiving platform direct from trucks. Loading the skids is done while the Truclift is in transit. Picking it up is a matter of seconds. The Clark Truclift then mounts the gangway and delivers loaded skid beside hold hatch whence it is lowered by sling. You are asked to judge the savings in your work from performance data secured in a wide variety of installations, including transportation companies. *Send the coupon.*



CLARK TRUCTRACTOR CO.
Battle Creek, Mich.

CLARK TRUCLIFTS

Clark Tructractor Co.,
Battle Creek, Michigan

Please send performance data on Clark Truclifts.

Name .....

Company .....

Address MR-4-29



How Goodrich Transit Company *saved $80,000 a year*

Get this book—turn to the report written by Mr. E. E. Taylor, President and General Manager of Goodrich Transit Company and read how the use of tractors and trailers save them $80,000 a year in handling freight.

And there are nineteen other reports on the returns rendered by this method, written by officials which will give you a comprehensive idea of the value of tractors and trailers to yourself.

Copies of this book are gladly sent to all who want to get cargo freight handling costs down to the lowest possible level.

Send us a note now requesting a copy. There's no obligation. Write.

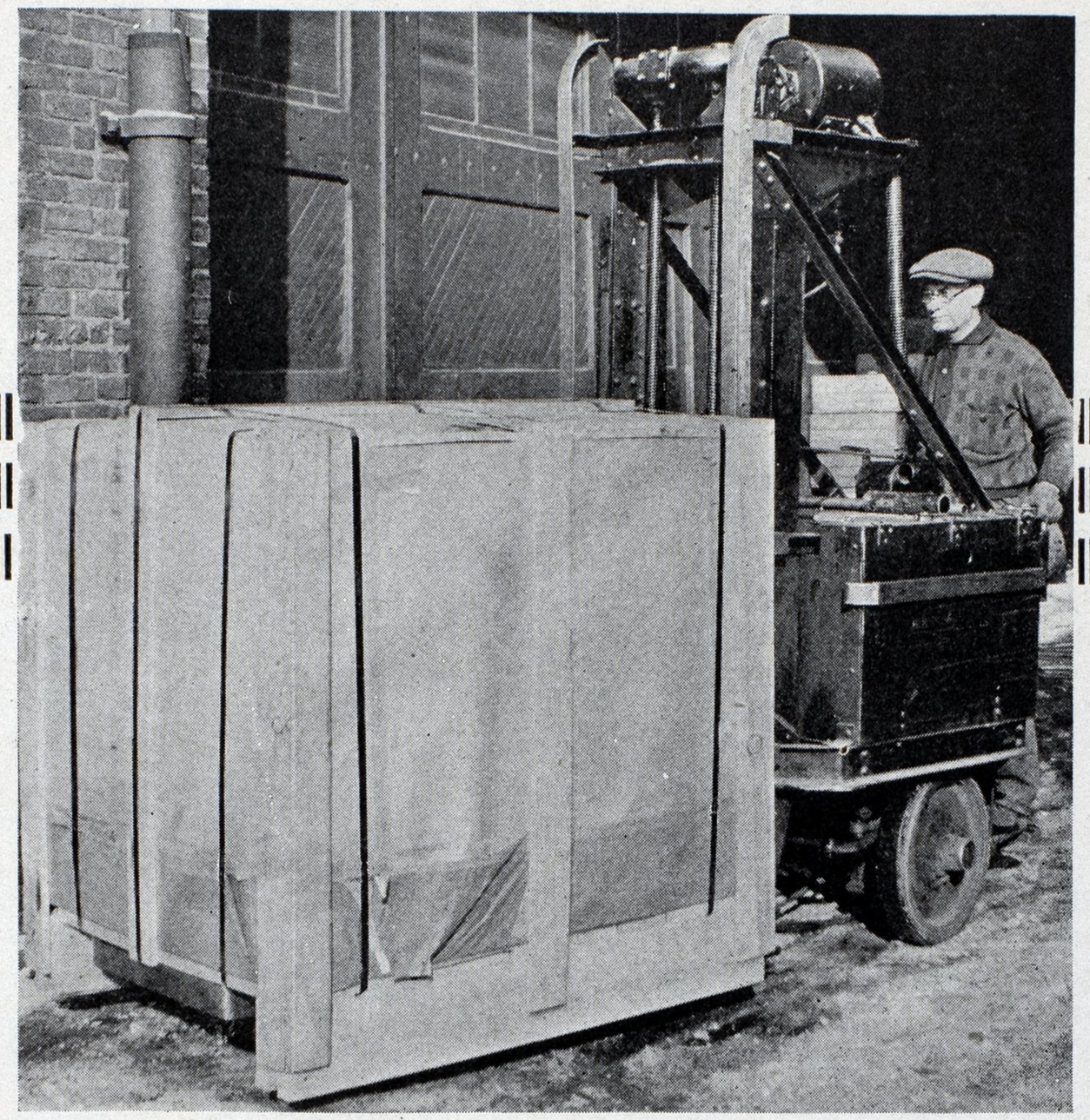
Mercury Manufacturing Co.,
4160 So. Halsted Street,
Chicago, Illinois

Canadian Representatives,
Laurie Machinery Co., Ltd.,
Insurance Exchange Bldg., Montreal, Can.

Mercury
Trackless Train

ACME NAILLESS BAND

FOR SECURING LOADS ON SKIDS



Thousands of manufacturers who are passively aware of the many advantages of skid shipping would readily adopt this practice if they knew of a positive way of fastening loads on skids quickly and at low cost.

The Acme Nailless Strapping method is the perfect solution of this problem. With Acme Tools and Band one man can easily strap a load like the above in approximately 3 or 4 minutes. Specially tempered, non-stretch Acme bands, testing 85,000 pounds per square inch tensile strength, insure absolute protection against shipping hazards. The cost is negligible.

Suggest the Acme Method to present and future shippers of materials on skids. It may be applied equally well to practically all types of loads.

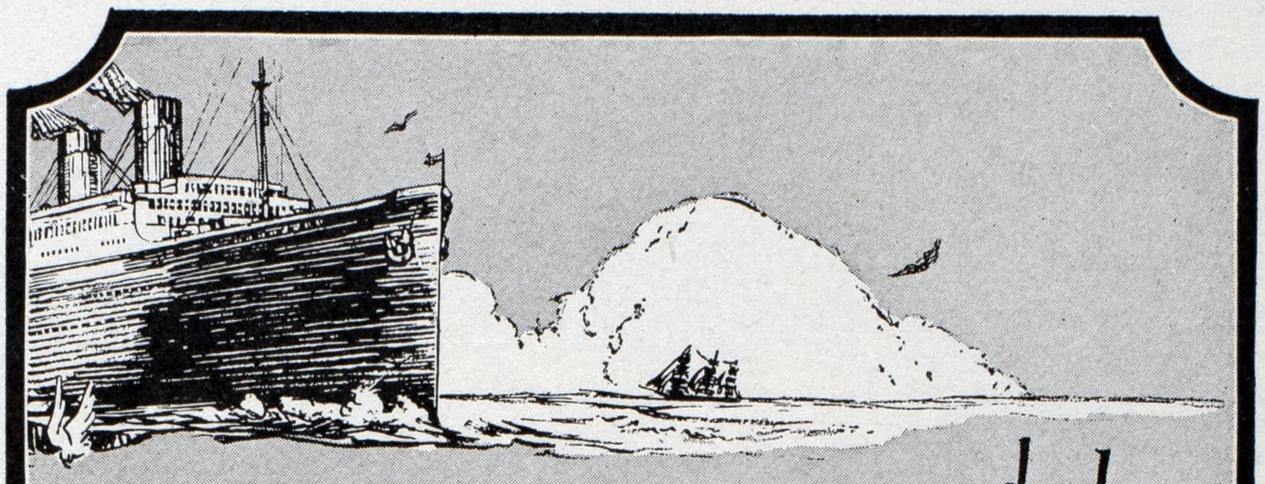
Acme Engineers are ready at all times to co-operate with you to the fullest extent in working out the safest and most economical shipping methods for your patrons.

ACME STEEL COMPANY

General Offices: 2840 Archer Avenue, Chicago, Ill.

The JACKLIFT LIFTS HIGHER

has demonstrated its superiority for Marine Work



USE JACKLIFTS *and Skids*

Increase Your Truck and Sling Loads

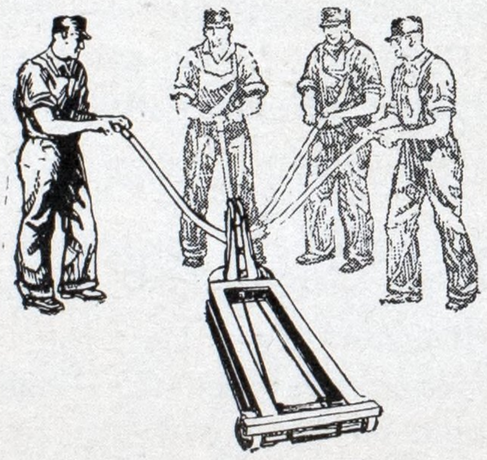
Save 20% to 70% and More of Your Handling Costs

IMPORTANT STEAMSHIP LINES are fast coming to use lift trucks and skids to increase units loads and eliminate rehandling. The Jacklift three-point suspension (twin wheels close together in front) makes it easier and safer to manoeuver loads on rough dock floors. The high lift eliminates trouble on inclines. The vertical release check requires no attention and lowers every load without shock. The "handle to the side lift" is indispensable for handling freight in the cramped quarters imposed by this service. Jacklifts are now used with great satisfaction on this type of work. Send for further facts.

Send for catalog and folder entitled "Ship on Skid Platforms." Lewis-Shepard Company, 170 Walnut Street, Watertown Station, Boston, Mass.

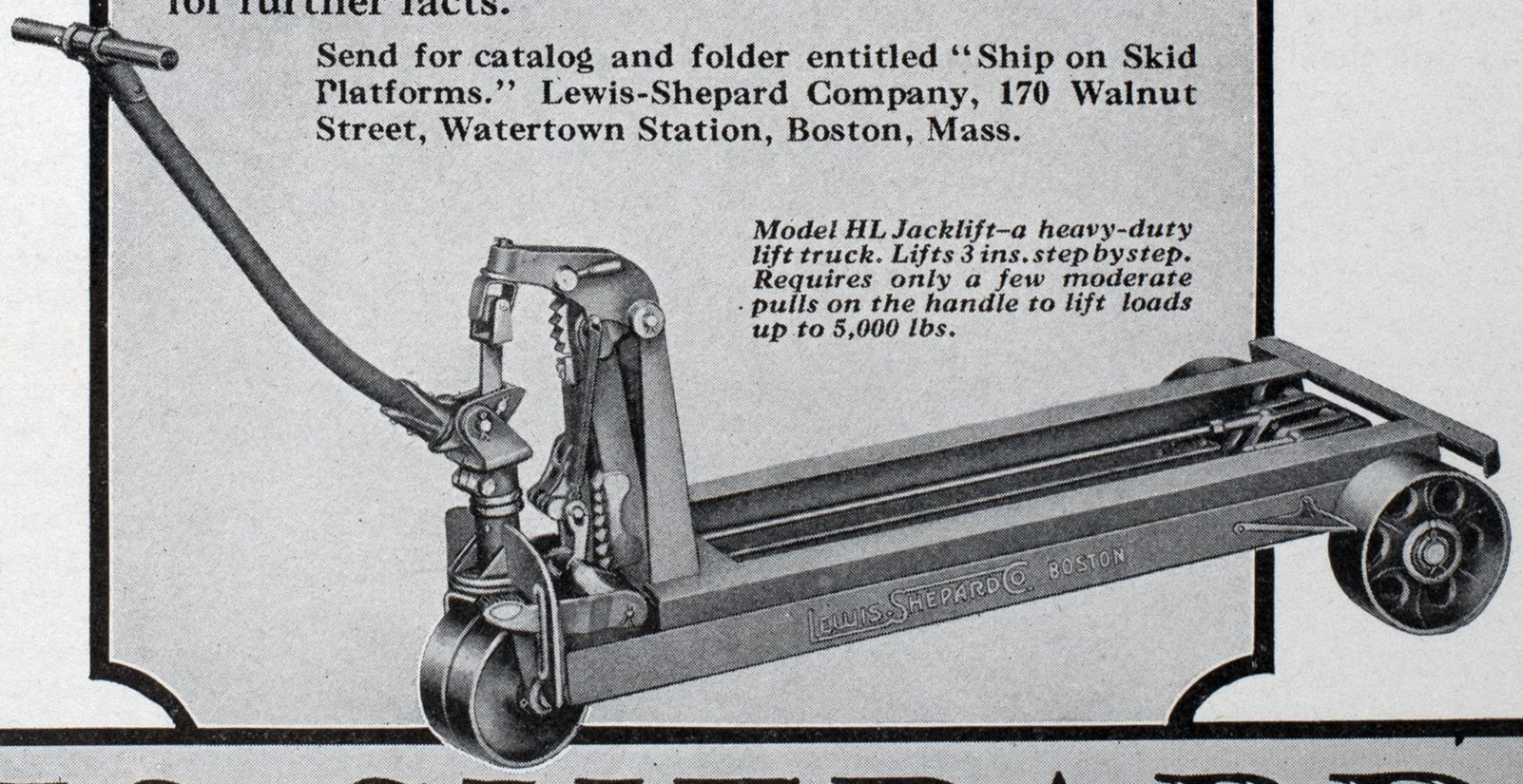


High Lift — The Jacklift gives a higher lift than any other hand-lift truck. This high lift allows sufficient clearance under the skid to prevent running aground on gang planks or ramps. Danger and delay are eliminated when you use Jacklifts.



You can always operate a Jacklift with the handle at any angle in an arc of 270°. This side lift is a great advantage in transferring or storing freight on deck, dock, or in warehouse.

A Jacklift will elevate the load in minimum space and narrow aisles. Never cornered by stanchions or posts. Lifts the heaviest loads with short, easy strokes of the handle.



Model HL Jacklift–a heavy-duty lift truck. Lifts 3 ins. step by step. Requires only a few moderate pulls on the handle to lift loads up to 5,000 lbs.

LEWIS-SHEPARD

Many Large Manufacturers are Shipping their Goods on Lewis-Shepard Skid Platforms



Mikimiki joins the *Grand Fleet* of F-M Diesel powered tugs

Mikimiki is the latest, largest and finest F-M Diesel powered ocean-going tug to join Young Bros. fleet.

She was built for a tough job. Fair weather or foul, her two 520 hp. F-M Diesel Engines must drive her on a rigid time schedule towing pineapple barges in the Hawaiian Islands.

Young Bros., her owners, who do all the towing in and around Honolulu, have found the F-M powered vessels in their fleet extremely economical and dependable. It is an eloquent testimonial to their records that Mikimiki is the tenth F-M powered vessel purchased with the added distinction of being the largest Diesel towing vessel in the world.

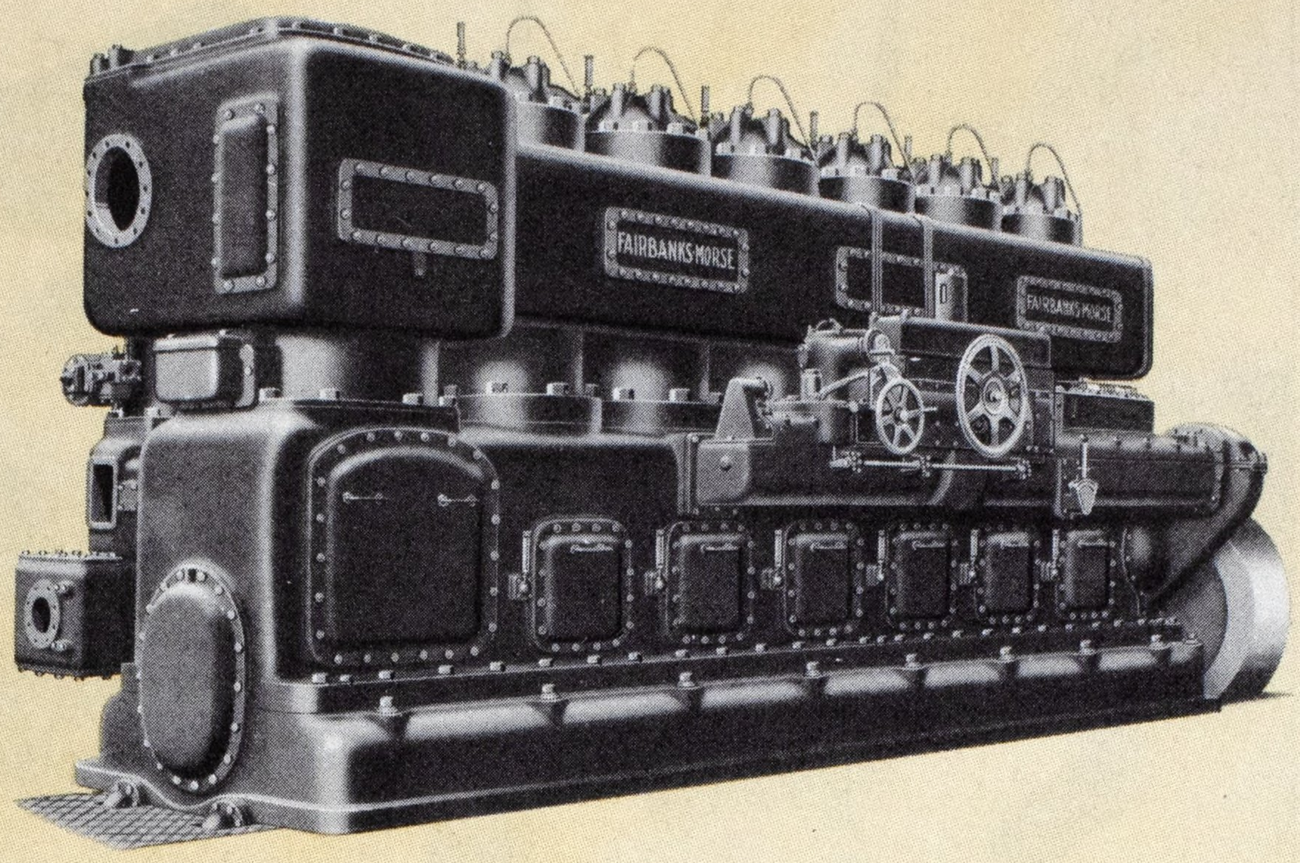
FAIRBANKS-MORSE

DIESEL ENGINES

POWER PUMPING AND WEIGHING EQUIPMENT

FAIRBANKS-MORSE DIESEL ENGINES

FAIRBANKS-MORSE DIESEL ENGINES



Mikimiki

(*Hawaiian for* "Alert *and* Ready")

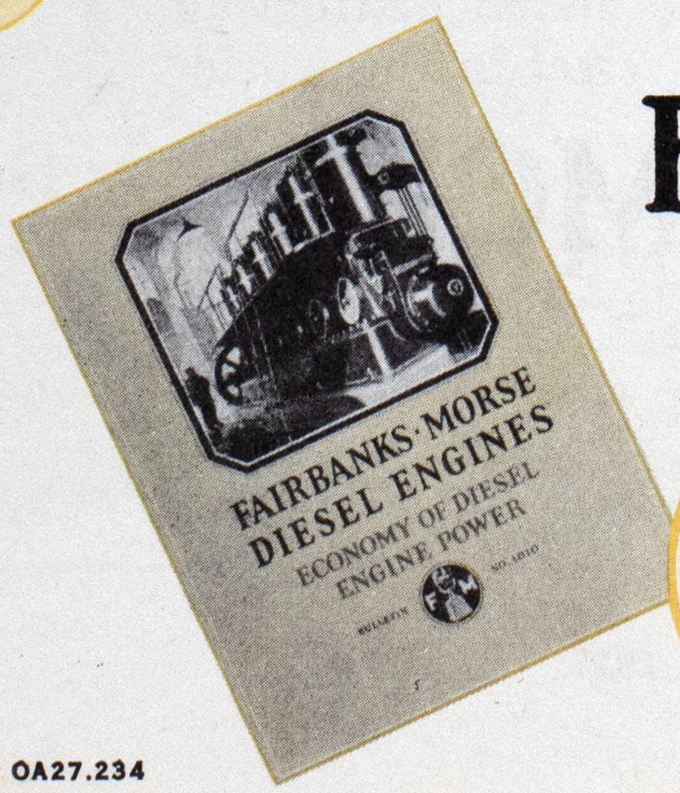
Mikimiki translated means alert and ready to go. This name is a fitting tribute to the fine records established by the nine F-M Diesel powered vessels now operating in Young Bros. fleet.

More than lower fuel cost, wider cruising radius and the elimination of standby losses is built into F-M Diesel powered vessels—they are always "Mikimiki."

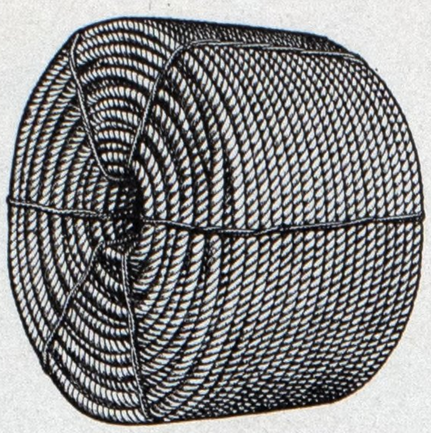
FAIRBANKS, MORSE & CO., *Chicago*

Branches with service stations in principal ports

FAIRBANKS-MORSE DIESEL ENGINES



OA27.234



Defies the elements!

The water-resisting qualities of Whitlock WATERFLEX cordage are of utmost importance especially in marine service where dampness, rain and continued immersion in water cause ordinary rope to swell, harden and kink, making it extremely hard to manage. The use of WATERFLEX avoids these difficulties.

WATERFLEX remains flexible under all conditions and is easy to handle and splice, *wet or dry*. It may be left out on deck in all kinds of weather with the assurance of protection against deterioration or *wet rot*, which shortens the serviceable life of ordinary rope.

WATERFLEX FIBORE (our patented fibre-core rope) is unquestionably the strongest and most efficient type of large cordage ever developed.

No additional charge is made for the patented WATERFLEX feature.

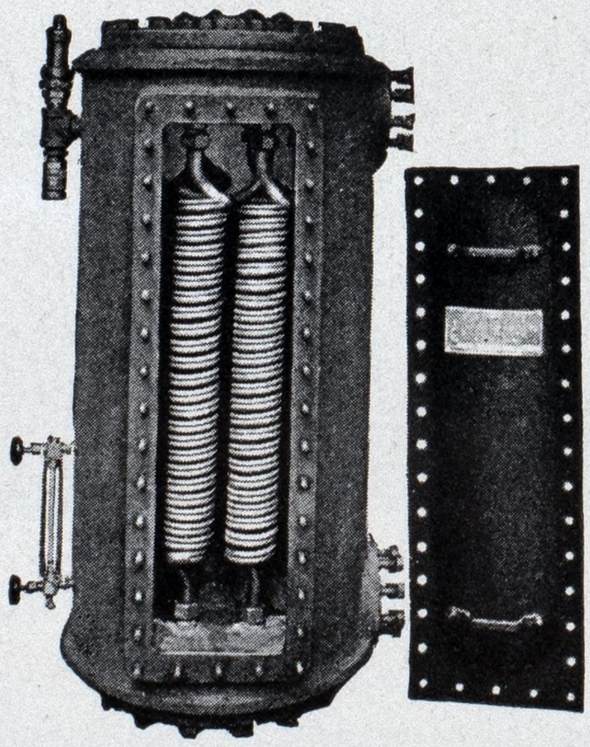
WHITLOCK CORDAGE COMPANY

Factory and Warehouses
Jersey City, N. J.

46 South Street
New York

Branches
Chicago, Boston, Kansas City
and Houston

Look Into the Reilly Heater



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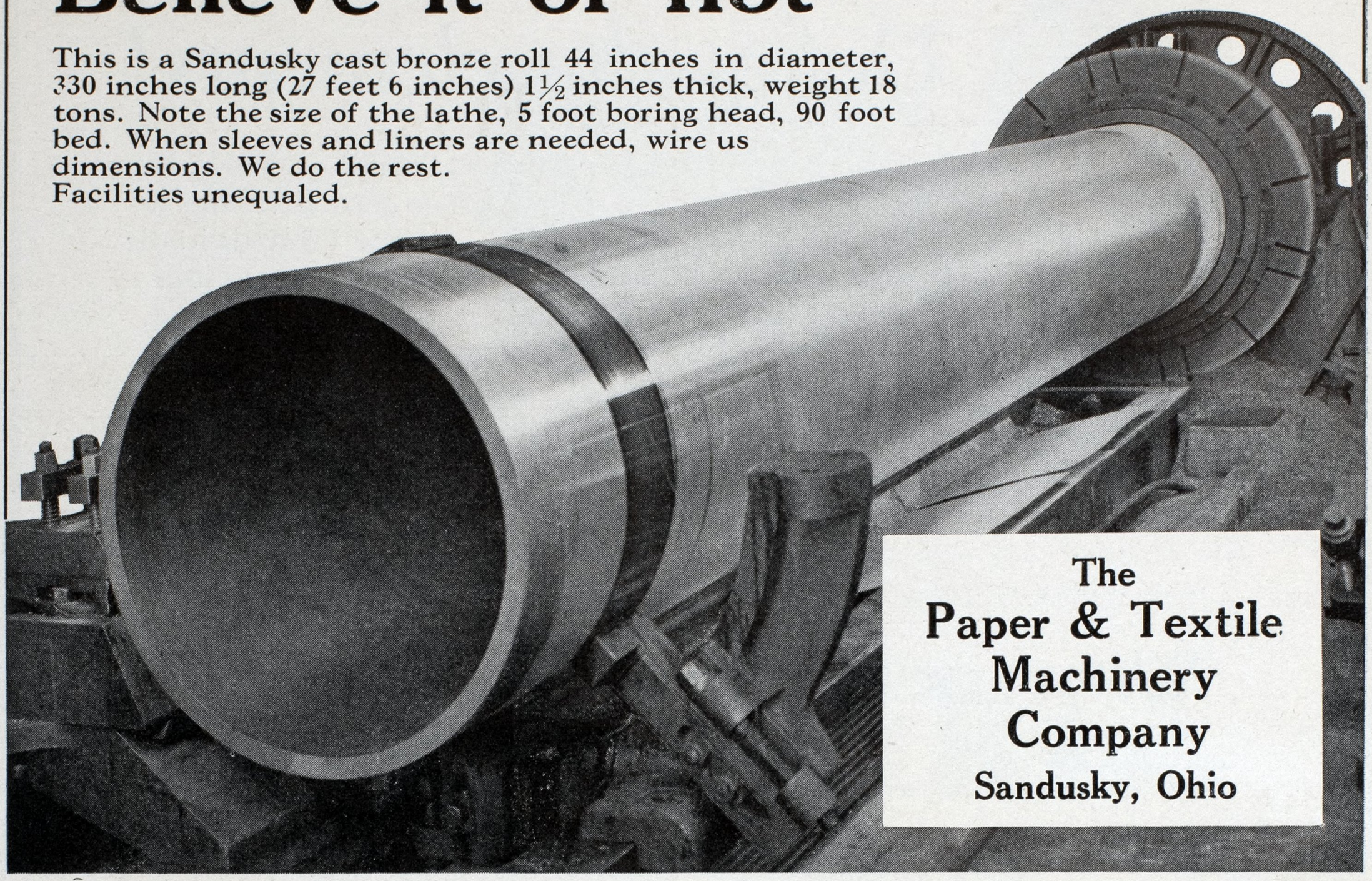
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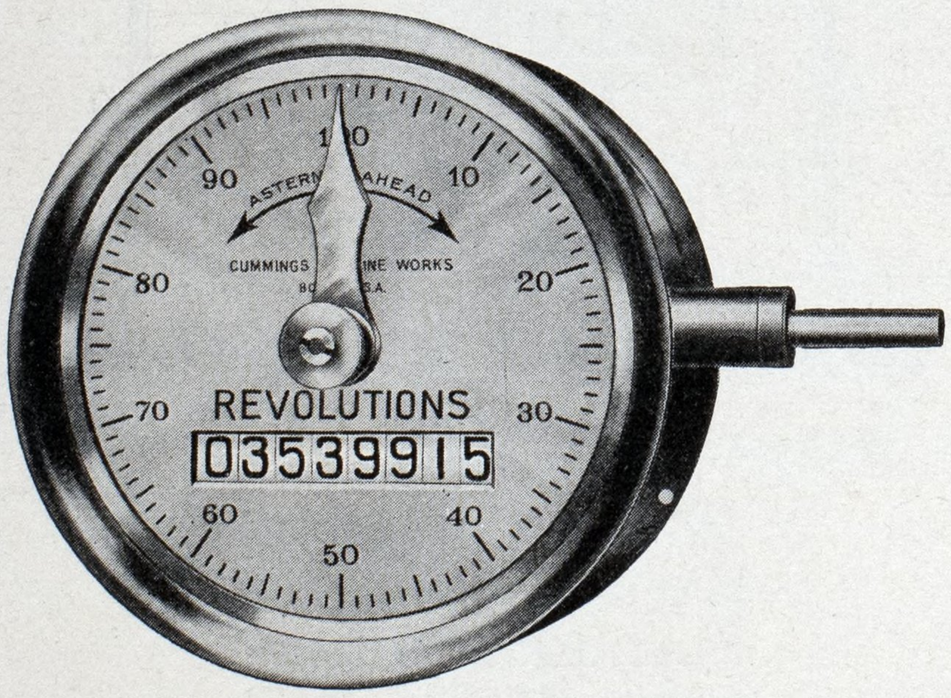
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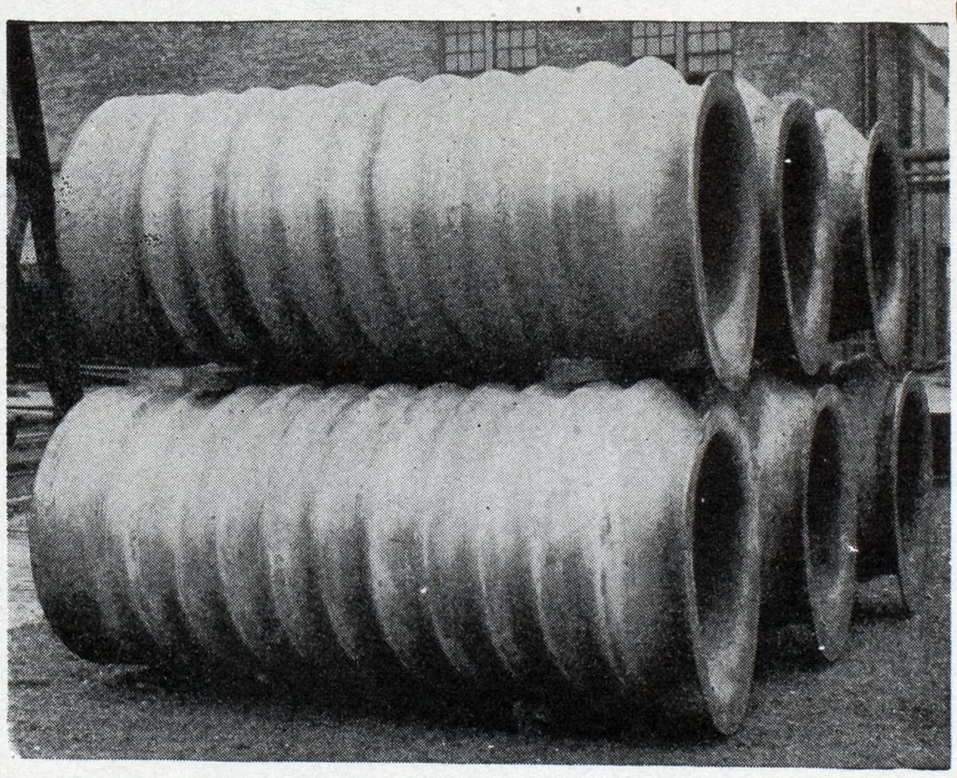
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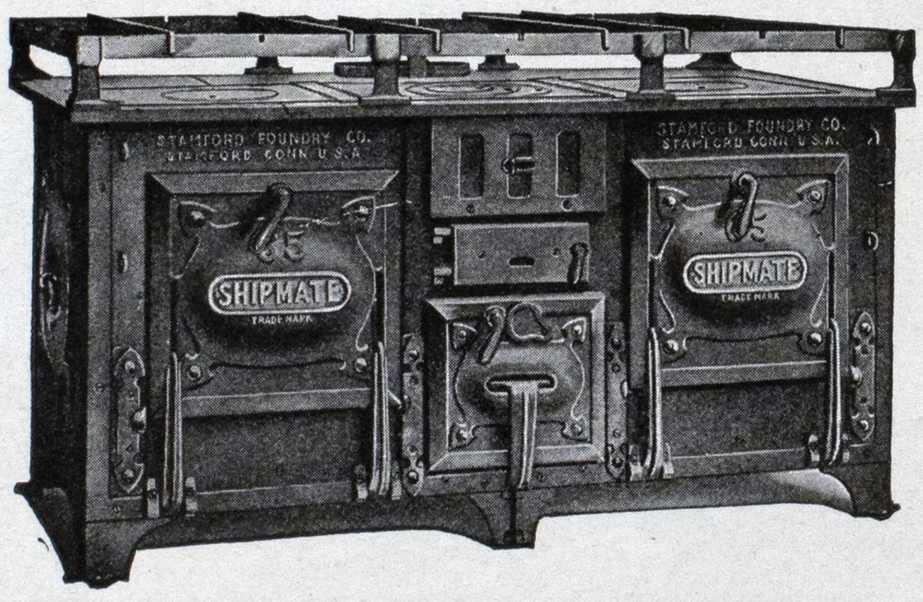
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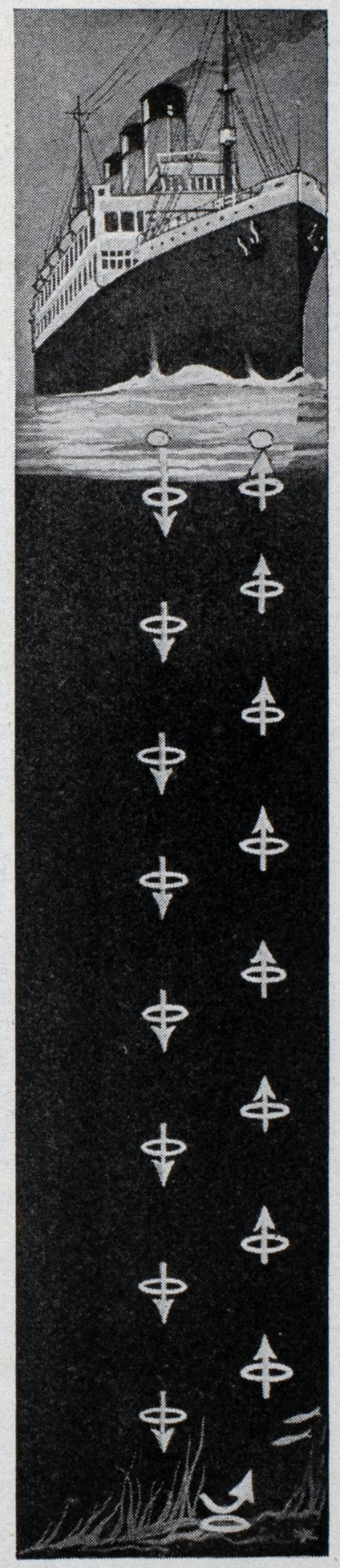
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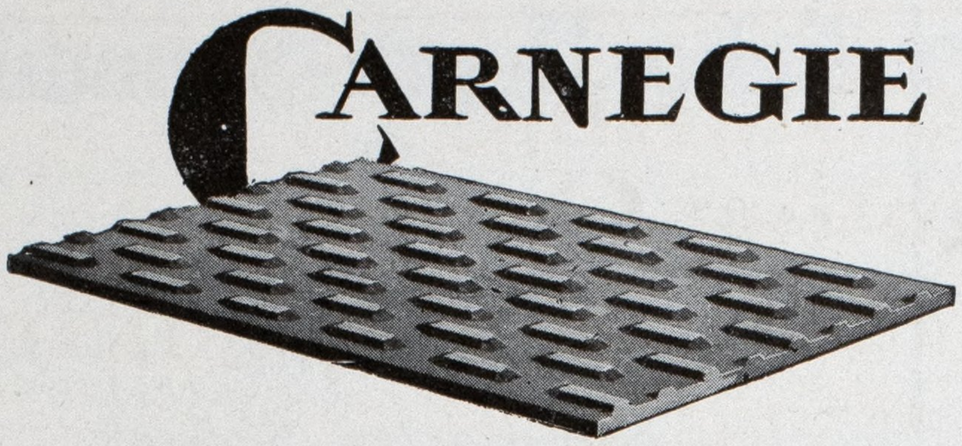
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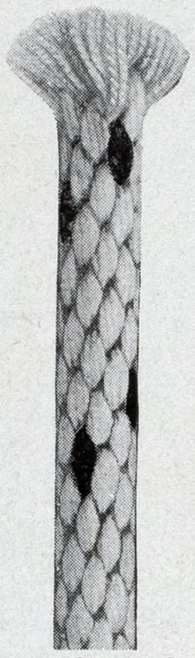
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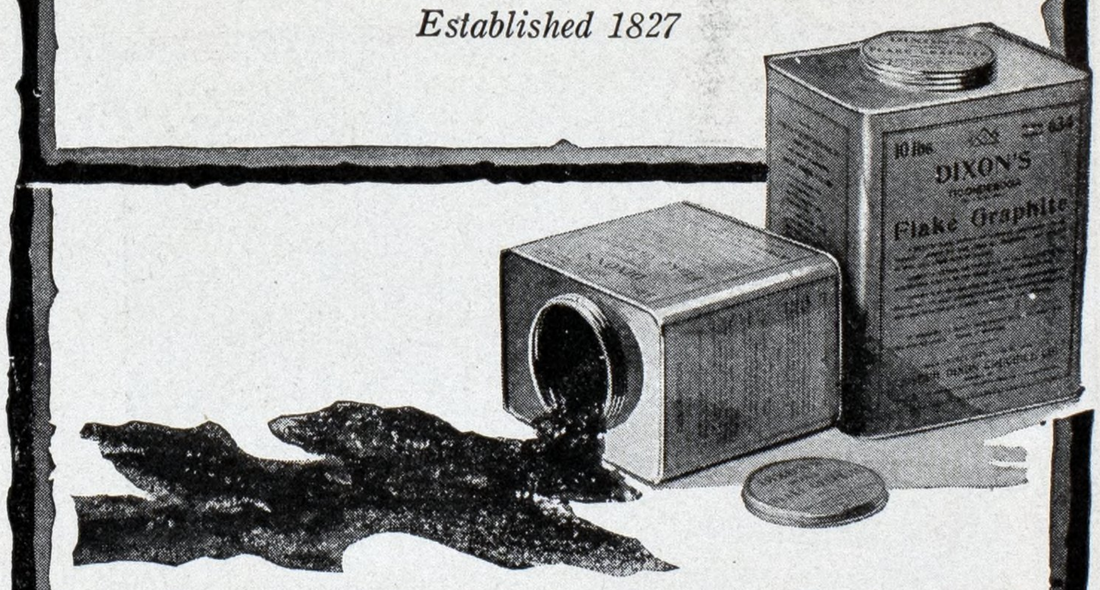
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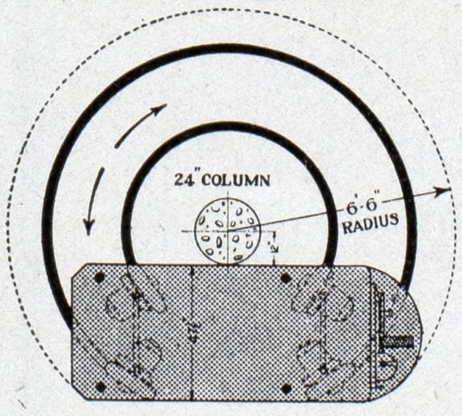
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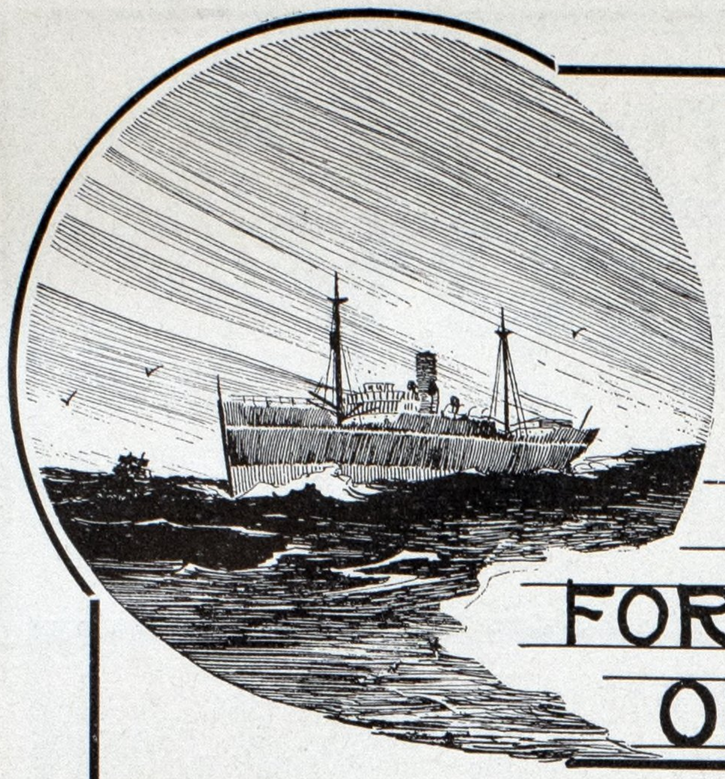


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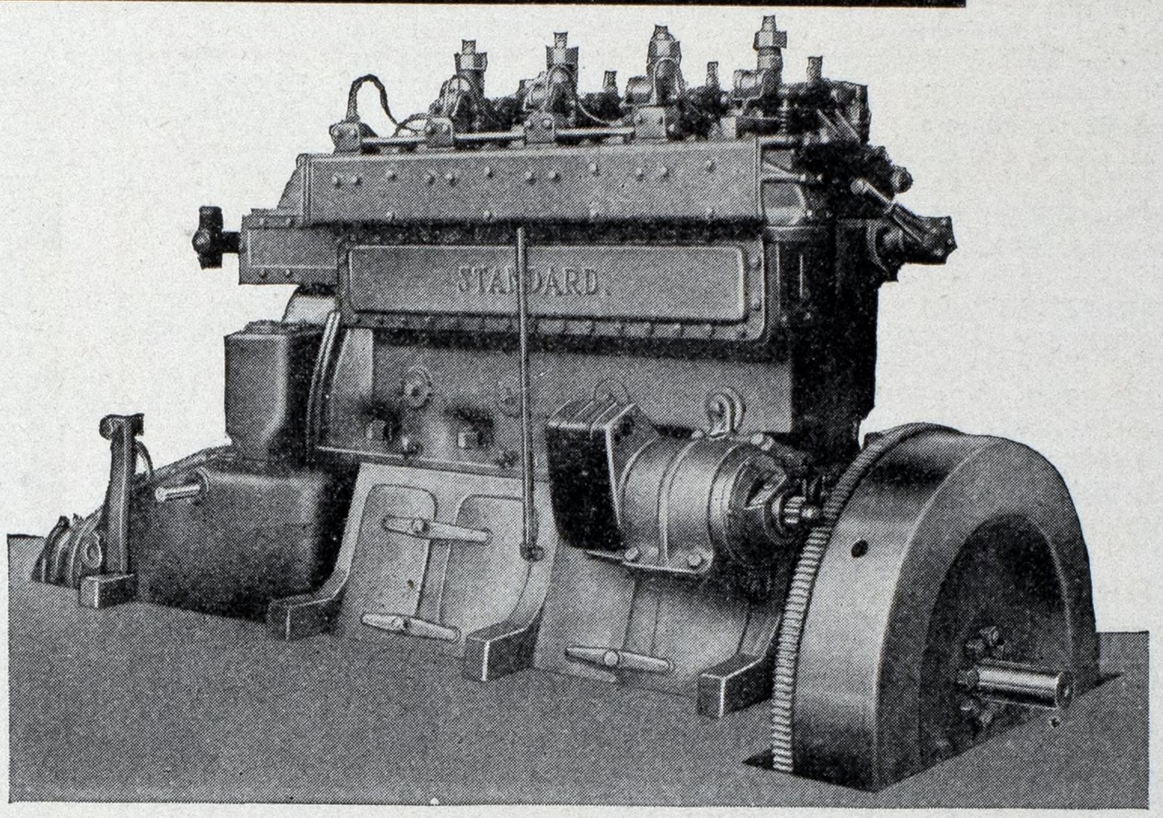
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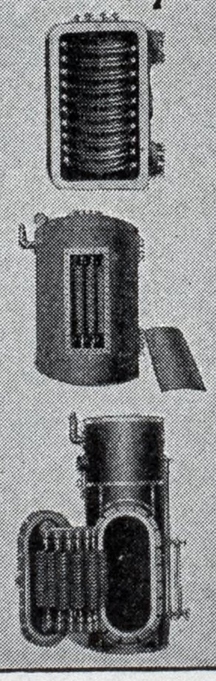
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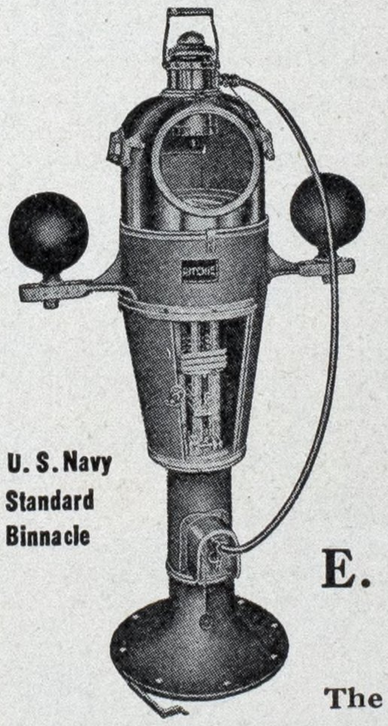
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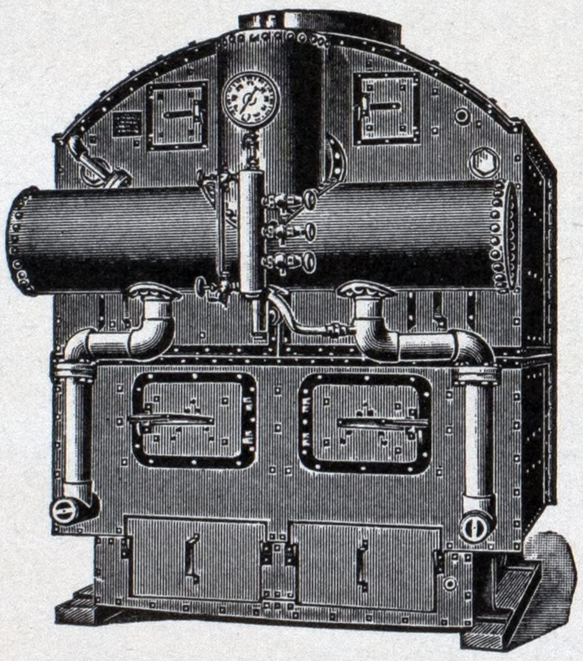
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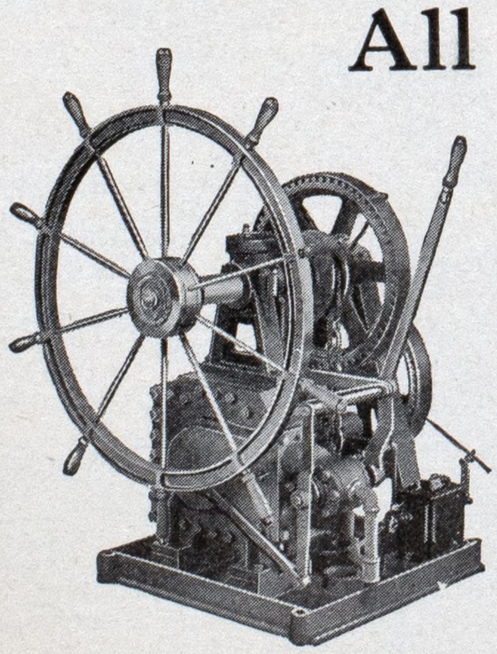
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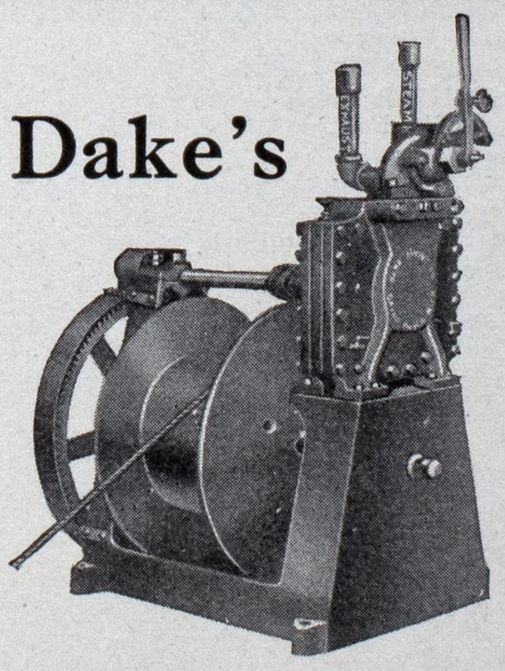


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FANS (Desk and Bracket-Oscillating and Non-Oscillating)
Diehl Manufacturing Co.,
Elizabethport, N. J.

FANS (Electric)
Diehl Manufacturing Co.,
Elizabethport, N. J.
General Electric Co.,
Schenectady, N. Y.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

FANS (Ventilating)
Diehl Manufacturing Co.,
Elizabethport, N. J.

FEED WATER HEATERS—See HEATERS AND PURIFIERS (Feed Water)

FEED WATER REGULATORS
Babcock & Wilcox Co.,
85 Liberty St., New York City.

FIRE EXTINGUISHER
American-LaFrance & Foamite Corp., Elmira, N. Y.

FIRE EXTINGUISHING SYSTEMS
American-LaFrance & Foamite Corp., Elmira, N. Y.

FIRE PROTECTION ENGINEERS
American-LaFrance & Foamite Corp., Elmira, N. Y.

FLANGES (Forged Steel Pipe)
American Spiral Pipe Works,
1440 S. 49th St., Chicago, Ill.

FLOORING
Selby Battersby & Co.,
810 Noble St., Philadelpiha, Pa.

FLOOR PLATES
Carnegie Steel Co.,
Carnegie Bldg., Pittsburgh, Pa.

FORGINGS
Erie Forge Co.,
15th & Cascade Sts., Erie, Pa.

FORGINGS (Diesel Engine)
Titusville Forge Co., Titusville, Pa.

FOUNDERS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co.,
Camden, N. J.

FREIGHT SERVICE
Hamburg-American Line,
39 Broadway, New York City.

FUEL OIL
Texas Co., The,
17 Battery Place, New York City
Vacuum Oil Co.,
61 Broadway, New York City.

FURNACES (Corrugated Boiler)
American Spiral Pipe Works,
1440 S. 49th St., Chicago, Ill.

FURNITURE
Marble & Shattuck Chair Co.,
10200 Foster Ave., Cleveland, O.

GALLEY RANGES
Stamford Foundry Co.,
Stamford, Conn.

GAS (Acetylene Dissolved)
Prest-O-Lite Co., Inc.,
30 East 42nd St., New York City.

GAS (Nitrogen and Oxygen)
Linde Air Products Co.,
30 East 42nd St., New York City.

GAS (Welding and Cutting)
Prest-O-Lite Co., Inc.,
30 East 42nd St., New York City.

GEARS (Marine Equipment)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

GENERATING SETS
Diehl Manufacturing Co.,
Elizabethport, N. J.
Fairbanks, Morse & Co.,
900 South Wabash Ave.,
Chicago, Ill.

GENERATING SETS (Direct Connected)
General Electric Co.,
Schenectady, N. Y.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

GENERATORS
Diehl Manufacturing Co.,
Elizabethport, N. J.
Fairbanks, Morse & Co.,
900 South Wabash Ave.,
Chicago, Ill.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

GRAPHITE
Dixon, Jos., Crucible Co.,
Jersey City, N. J.

GRAPHITE GREASES
Dixon, Jos., Crucible Co.,
Jersey City, N. J.

GRAPHITE PAINT
Dixon, Jos., Crucible Co.,
Jersey City, N. J.

GRAPHITE PIPE JOINT COMPOUNDS
Dixon, Jos., Crucible Co.,
Jersey City, N. J.

GREASE
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

GREASE (Launching)
Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

GYPSEYS
American Engineering Co.,
Cumberland & Aramingo St.,
Philadelphia, Pa.

HARDWARE (Marine)—See MARINE HARDWARE

HATCH FASTENERS
Mullholland Hatch-Fastener Co.,
Marion Bldg., Cleveland, O.

HAWSERS (Manila)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works,
Boston, Mass.
Whitlock Cordage Co.,
46 South St., New York City.

HEATERS AND PURIFIERS (Feed Water)
Davis Engineering Co.,
90 West St., New York City.
Griscom-Russell Co.,
285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

HEATING EQUIPMENT
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

HEATING STOVES
Stamford Foundry Co.,
Stamford, Conn.

HOISTING ENGINES
Hyde Windlass Co.,
Bath, Me.

HOISTS (Air)
American Shipbuilding Co.,
Foot of W. 54th St.,
Cleveland, O.

HOISTS (Electric, Pneumatic, Hand)
American Engineering Co.,
Cumberland & Aramingo St.,
Philadelphia, Pa.

HOOPS AND BANDS
Acme Steel Co.,
2840 Archer Ave., Chicago, Ill.

HULLS (Steel)
Ellis Channel System, Inc.,
33 Rector St., New York City.

ICE MACHINES—See REFRIGERATING MACHINERY

INSURANCE (Marine)
Boland & Cornelius,
Marine Trust Bldg.,
Buffalo, N. Y.

INTERNAL COMBUSTION ENGINES
Burmeister & Wain,
Maskin-og Skibsbyggeri,
Copenhagen, Denmark.

LAMPS (Mazda and Arc)
General Electric Co.,
Schenectady, N. Y.

LIFEBOATS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.
Welin Davit & Boat Corp.,
3-5 Vernon Ave.,
Long Island City, N. Y.

LIFESAVING EQUIPMENT
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

LOGS (Patent)
Walker, Thomas, & Son, Ltd.,
58 Oxford St.,
Birmingham, England.

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Texas Co., The,
17 Battery Place, New York City.
Vacuum Oil Co.,
61 Broadway, New York City.

MACHINERY (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Bessemer Engine Co.,
Grove City, Pa.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Chicago Shipbuilding Co.,
So. Chicago, Ill.
Great Lakes Engineering Works,
River Rouge, Mich.
Hoovens-Owen Rentschler Co.,
Hamilton, O.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Maryland Dry Dock Co.,
Baltimore Md.
Toledo Shipbuilding Co., Toledo, O.

MACHINES (Sounding)
Submarine Signal Co.,
160 State St., Boston, Mass.

MACHINISTS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Busch-Sulzer Bros.-Diesel Engine Co., 2nd & Utah Sts.,
St. Louis, Mo.
Hoovens-Owens Rentschler Co.,
Hamilton, O.
New York Shipbuilding Co.,
Camden, N. J.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE DECKING—See DECKING

MARINE ENGINES
Burmeister & Wain,
Maskin-og Skibsbyggeri,
Copenhagen, Denmark

MARINE RAILWAY BUILDERS
Crandall Engineering Co.,
134 Main St., Cambridge, Mass.

MATERIAL HANDLING EQUIPMENT
Smith, Leathem D., Dock Co.,
Sturgeon Bay, Wis.

MOTOR GENERATOR SETS
Diehl Manufacturing Co.,
Elizabethport, N. J.
Fairbanks, Morse & Co.,
900 South Wabash Ave.,
Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Electric)
Diehl Manufacturing Co.,
Elizabethport, N. J.
Fairbanks, Morse & Co.,
900 South Wabash Ave.,
Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

MOTORS (Winch)
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS
Ritchie, E. S., & Sons,
Brookline, Mass.

NAVIGATION INSTRUMENTS
White, Kelvin & Wilfrid O., Co.,
112 State St., Boston, Mass.

NITROGEN (Gas)
Linde Air Products Co.,
30 East 42nd St., New York City

OAKUM (Marine, Rope, Packings, Plumbers)
Stratford, George, Oakum Co.,
165 Cornelison Ave.,
Jersey City, N. J.

OIL BURNING EQUIPMENT
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Coen Company,
50 Church St., New York City.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

OIL CLARIFIERS
Sharples Specialty Co.,
Westmoreland, Philadelphia, Pa.

OIL PURIFIERS
Sharpes Specialty Co.,
Westmoreland, Philadelphia, Pa.

OIL FOR ALL PURPOSES (Marine)
Texas Co., The, 17 Battery Place,
New York City.
Vacuum Oil Co., 61 Broadway,
New York City.

OXYGEN (Gas)
Linde Air Products Co.,
30 East 42nd St., New York City.

PACKING RINGS
American Hammered Piston Ring Co., Baltimore, Md.

PASSENGER SERVICE
Hamburg-American Line,
39 Broadway, New York City.

PIPE (Iron and Steel)
American Spiral Pipe Works,
1440 S. 49th St., Chicago, Ill.

PISTON RING MANUFACTURERS
American Hammered Piston Ring Co., Baltimore, Md.

PLATES (Rolled Zinc)
Hazel-Atlas Glass Co.,
16th & Market St.,
Wheeling, W. Va.

PORT FACILITIES
Newark, Port of
City Hall, Newark, N. J.

POWDERED COAL BURNERS
Coen Company,
50 Church St., New York City.

PROPELLER BLADES AND HUBS
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS
American Shipbuilding Co.,
Foot of W. 54th St.,
Cleveland, O.
Detroit Ship Building Co.,
Detroit, Mich.
Great Lakes Engineering Works,
River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway,
New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.
Toledo Shipbuilding Co.,
Toledo, O.
Trout, H. G Co., 220 Ohio St.,
Buffalo, N. Y.

PROPELLERS
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway,
New York City.

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Star Brass Mfg. Co.

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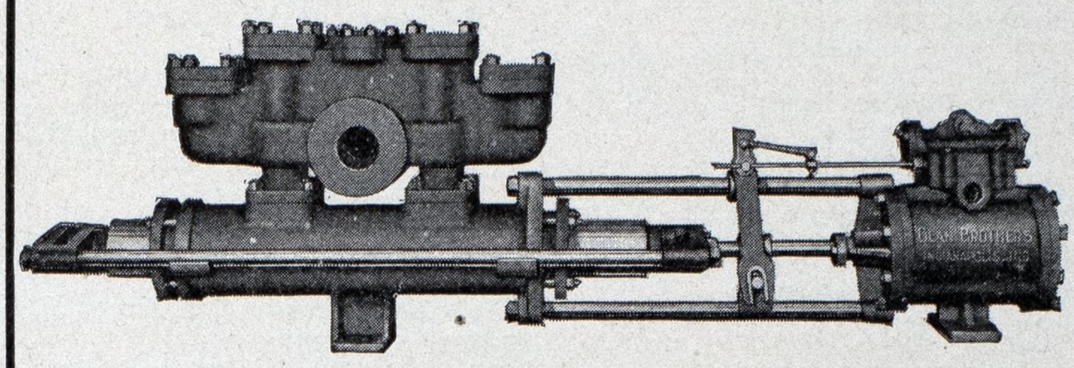


Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

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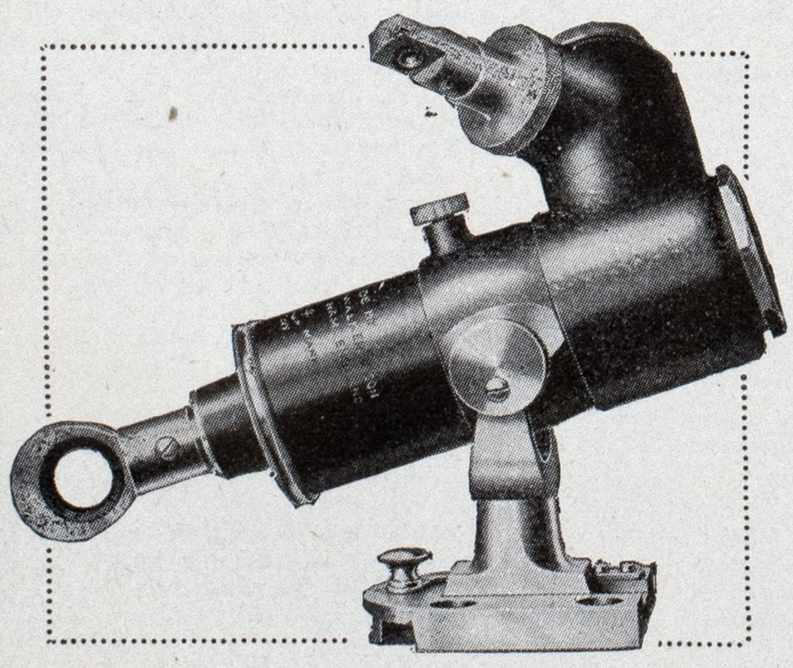
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Callahan Shut-Off Nozzle

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Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.
Great Lakes Engineering Works, River Rouge, Mich.
Ingersoll-Rand Co., 11 Broadway, New York City.

PUMPS (Ballast)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.

PUMPS (Bilge)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.

PUMPS (Boiler Feed)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.

PUMPS (Direct Acting)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.

PUMPS (Fuel Oil)
Coen Company, 50 Church St., New York City

PUMPS (Power)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.

PUMPS (Steam)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.

PUMPS (Vacuum)
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

PURIFIERS (Oil)
Sharples Specialty Co., Westmoreland, Philadelphia, Pa.

RADIO COMPASS AND DIRECTION FINDER
Radiomarine Corp. of America, 66 Broad St., New York City.

RADIO EQUIPMENT
Radiomarine Corp. of America, 66 Broad St., New York City.

RAFTS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

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Crandall Engineering Co., 134 Main St., Cambridge, Mass.

RANGES
Stamford Foundry Co., Stamford, Conn.

REFRIGERATING MACHINERY
Brunswick-Kroeschell. Co., New Brunswick, N. J.

REPAIRS
Maryland Dry Dock Co., Baltimore, Md.

REPAIRS (Electric)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

REPAIRS (Marine)
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Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Chicago Shipbuilding Co., So. Chicago, Ill.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Shipbuilding Co., Toledo, O.
United Drydocks, Inc., 11 Broadway, New York City

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Bath Iron Works Corporation, Bath, Maine.
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada
Hooven-Owens Rentschler Co., Hamilton, O.

REPAIRS (Turbine)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

REVOLUTION COUNTERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.
Sperry Gyroscope Co., Manhattan Bridge Plaza, Brooklyn, N. Y.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City.

ROPE (Transmission)
Columbian Rope Co., Auburn, N. Y.

ROPE OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

RUBBER TILE
Selby Battersby & Co., 810 Noble St., Philadelphia, Pa.

RUST PREVENTATIVE (Oil)
Texas Co., The, 17 Battery Place, New York City.
Vacuum Oil Co., 61 Broadway, New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Chicago Shipbuilding Co., So. Chicago, Ill.
Toledo Shipbuilding Co., Toledo, O.

SEARCHLIGHTS (Incandescent and Arc)
General Electric Co., Schenectady, N. Y.

SELF UNLOADING EQUIPMENT
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.

SEPARATORS (Oil)
Babcock & Wilcox Co., 85 Liberty St., New York City.
Sharples Specialty Co, Westmoreland, Philadelphia, Pa.

SHAFTING COVERING
Paper & Textile Machinery Co., Sandusky, O.

SHIPBUILDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bath Iron Works Corporation, Bath, Maine.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Pusey & Jones Corp., Wilmington, Del.
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.
Spear Engineers, Inc., Bankers Trust Bldg., Norfolk, Va.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Shipbuilding Co., Toledo, O.
United Drydocks, Inc., 11 Broadway, New York City.

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SHIP CONSTRUCTION (Channel System)
Ellis Channel System, Inc., 33 Rector St., New York City.

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SHIP REPAIR (Marine)
Collingwood Shipyards, Ltd., Collingwood, Ont., Canada.

SIGNALS (Submarine)
Submarine Signal Co., 160 State St., Boston, Mass.

SLEEVES (Rubber)
Paper & Textile Machinery Co., Sandusky, O.

SOUNDING MACHINES
Submarine Signal Co., 160 State St., Boston, Mass.

SPUN OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

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STEAM TRAPS
Davis Engineering Co., 90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEEL TANKS
Brunswick-Kroeschell Co., New Brunswick, N. J.

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING GEARS
American Engineering Co., Cumberland & Aramingo St., Philadelphia, Pa.
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STORAGE BATTERIES See BATTERIES

STOVES
Stamford Foundry Co., Stamford, Conn.

STRAINERS (Oil)
Coen Company, 50 Church St., New York City.

STRIP STEEL
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.

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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Whitlock Cordage Co., 46 South St., New York City.

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Lewis-Shepard Co., Watertown Station, 125 Walnut St., Boston, Mass.
Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill.
Stuebing Cowan Co., 312 Court St., Cincinnati, O.
Terminal Engineering Corp., 17 Battery Place, New York City.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRUCKS
Clark Tructractor Co., Battle Creek, Mich.
Lewis-Shepard Co., Watertown Station, 125 Walnut St., Boston, Mass.
Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill.
Stuebing Cowan Co., 312 Court St., Cincinnati, O.
Terminal Engineering Corp., 17 Battery Place, New York City.

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Keating, E. F., Co., 446 Water St., New York City.

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General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

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Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

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Da Laval Steam Turbine Co., Trenton, N. J.
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Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

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Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City.

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American Hammered Piston Ring Co., Baltimore, Md.

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Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.

VENTILATING EQUIPMENT
Diehl Manufacturing Co., Elizabethport, N. J.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

WAREHOUSE FACILITIES
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WATER PURIFICATION SYSTEMS
Griscom-Russell Co., 285 Madison Ave., New York City.

WELDERS (Electric Arc)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING AND CUTTING GAS
Prest-O-Lite Co., Inc., 30 East 42nd St., New York City.

WHISTLES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

WINCHES
American Engineering Co., Cumberland & Aramingo St., Phildaelphia, Pa.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDLASSES
American Engineering Co., Cumberland & Aramingo St., Philadelphia, Pa.
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDOWS (Balanced Frameless)
Kearfott Engineering Co., 117 Liberty St., New York City.

WIRELESS MESSAGE SERVICE
Radiomarine Corp. of America, 66 Broad St., New York City.

WIRELESS SETS AND APPARATUS
Radiomarine Corp. of America, 66 Broad St., New York City.

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Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

ZINC (Plates Rolled)
Hazel-Atlas Glass Co., 16th & Market St., Wheeling, W. Va.

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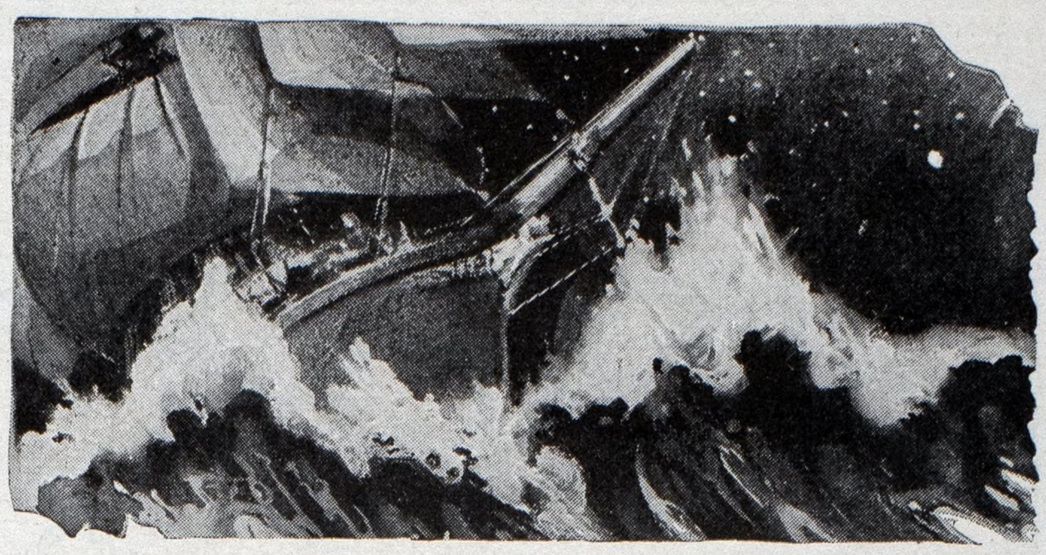
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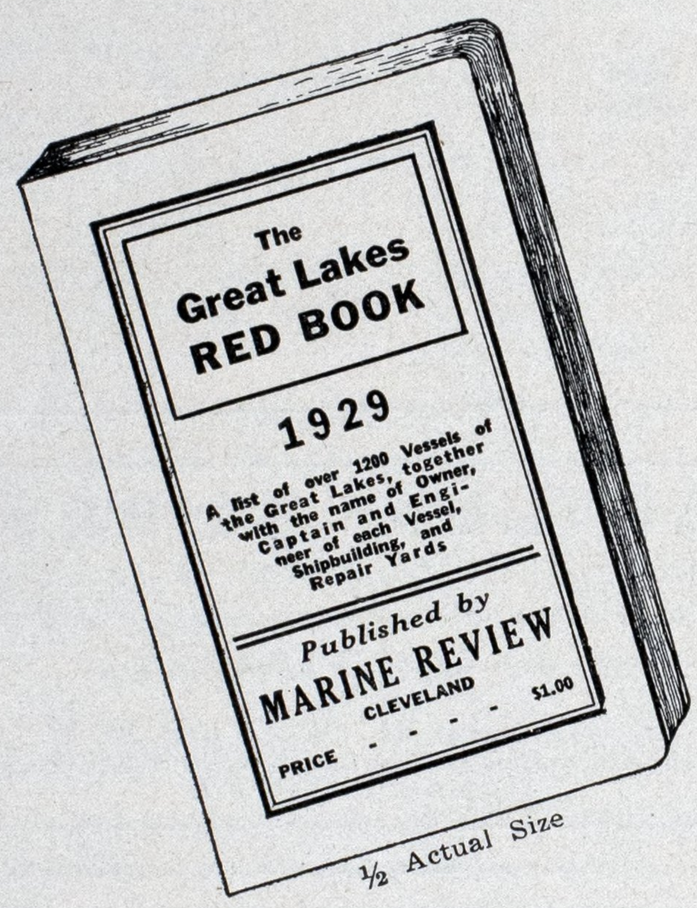
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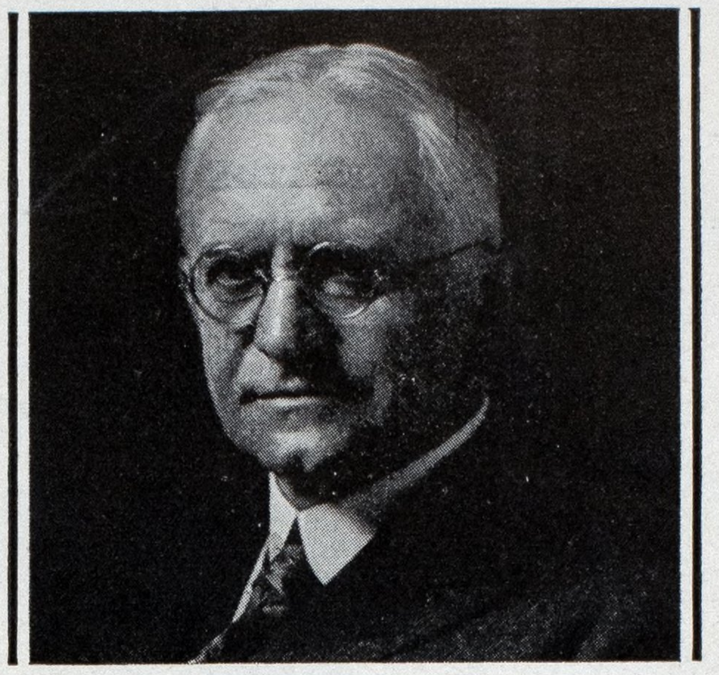
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TEXAS UKAY LINE
Galveston, Texas
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CHAIRMAN OF THE BOARD, EASTMAN KODAK COMPANY

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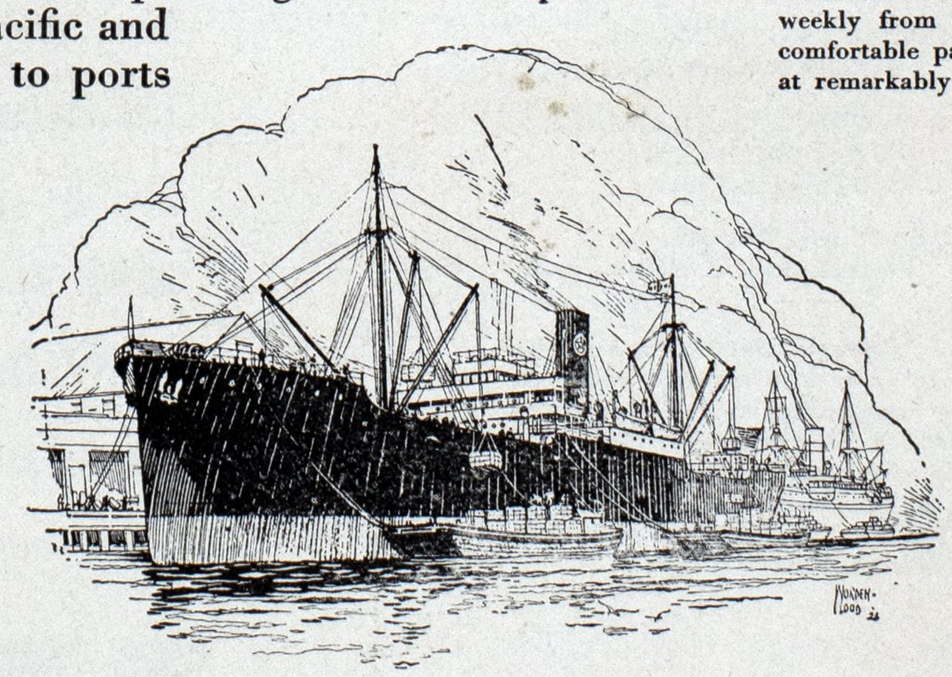
Under the direction of experienced American operators, these world-wide services have established a remarkable record for efficient and economical transportation of ocean cargo.

In addition to the twenty lines operated for the Shipping Board, there are seventeen services developed by the Shipping Board but now under private management—a combined fleet of several hundred vessels operating from Atlantic, Pacific and Gulf ports to ports in every corner of the earth.

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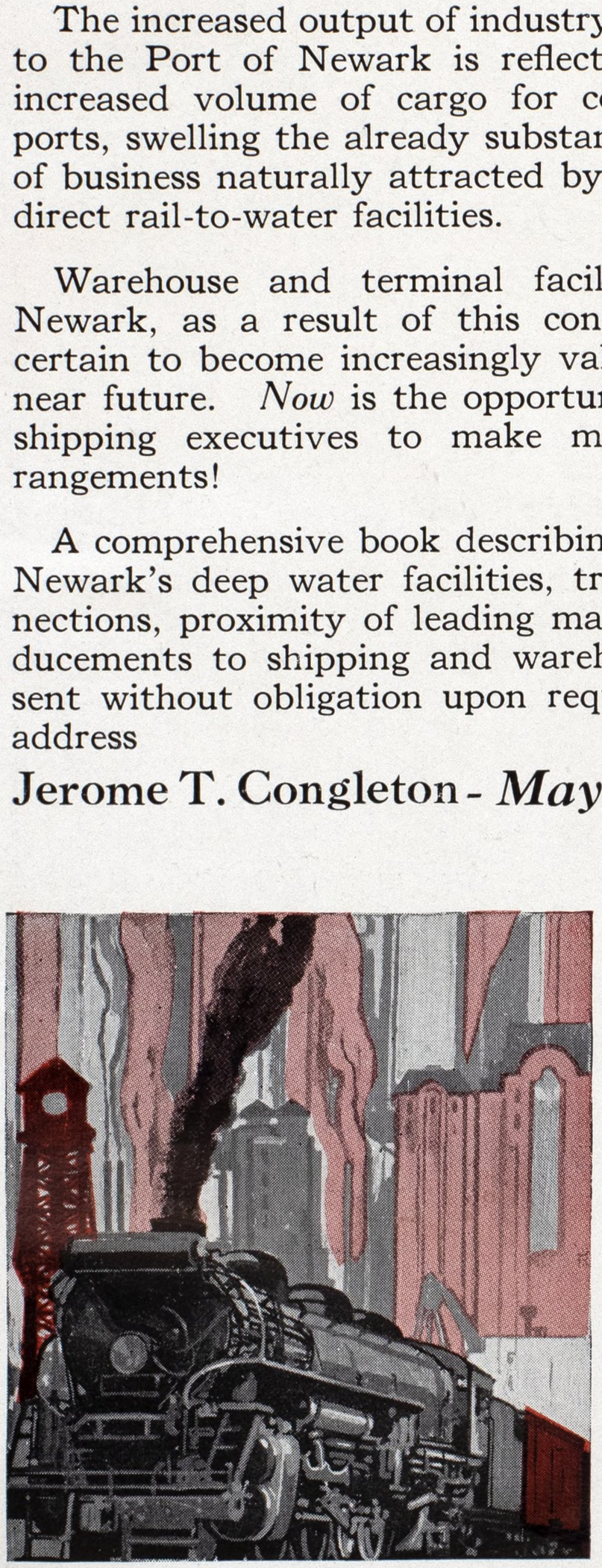
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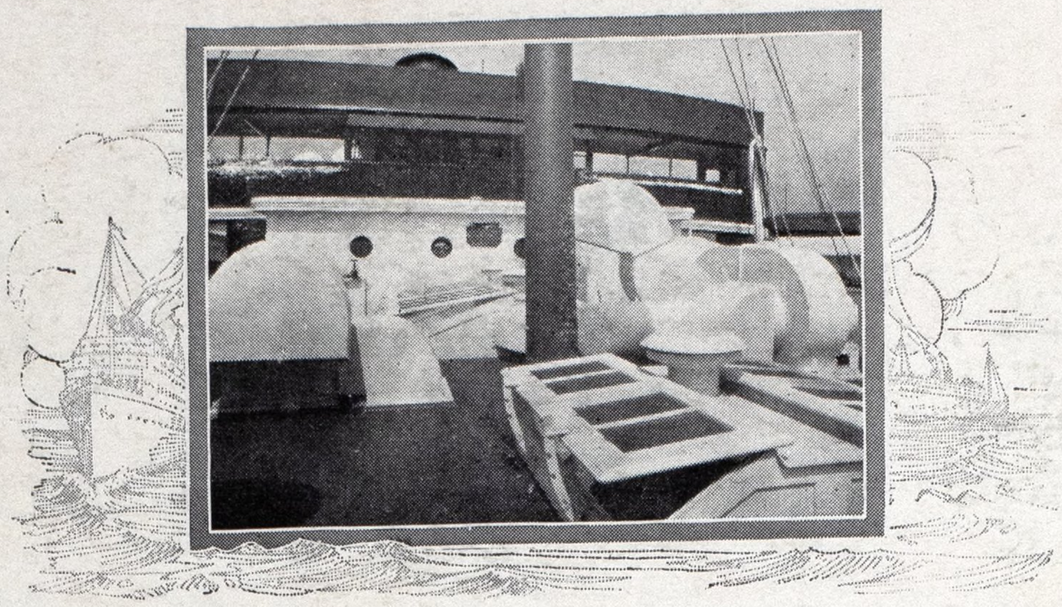
To enable you to make a general, preliminary study of the Port of Newark and its possibilities, we will gladly send you, without cost or obligation, a comprehensive illustrated book full of facts about the Port of Newark and its trading area. Write for it.



The PORT of NEWARK

"Where Railways, Waterways, Airways and Highways Meet"

MARINE REVIEW—April, 1929



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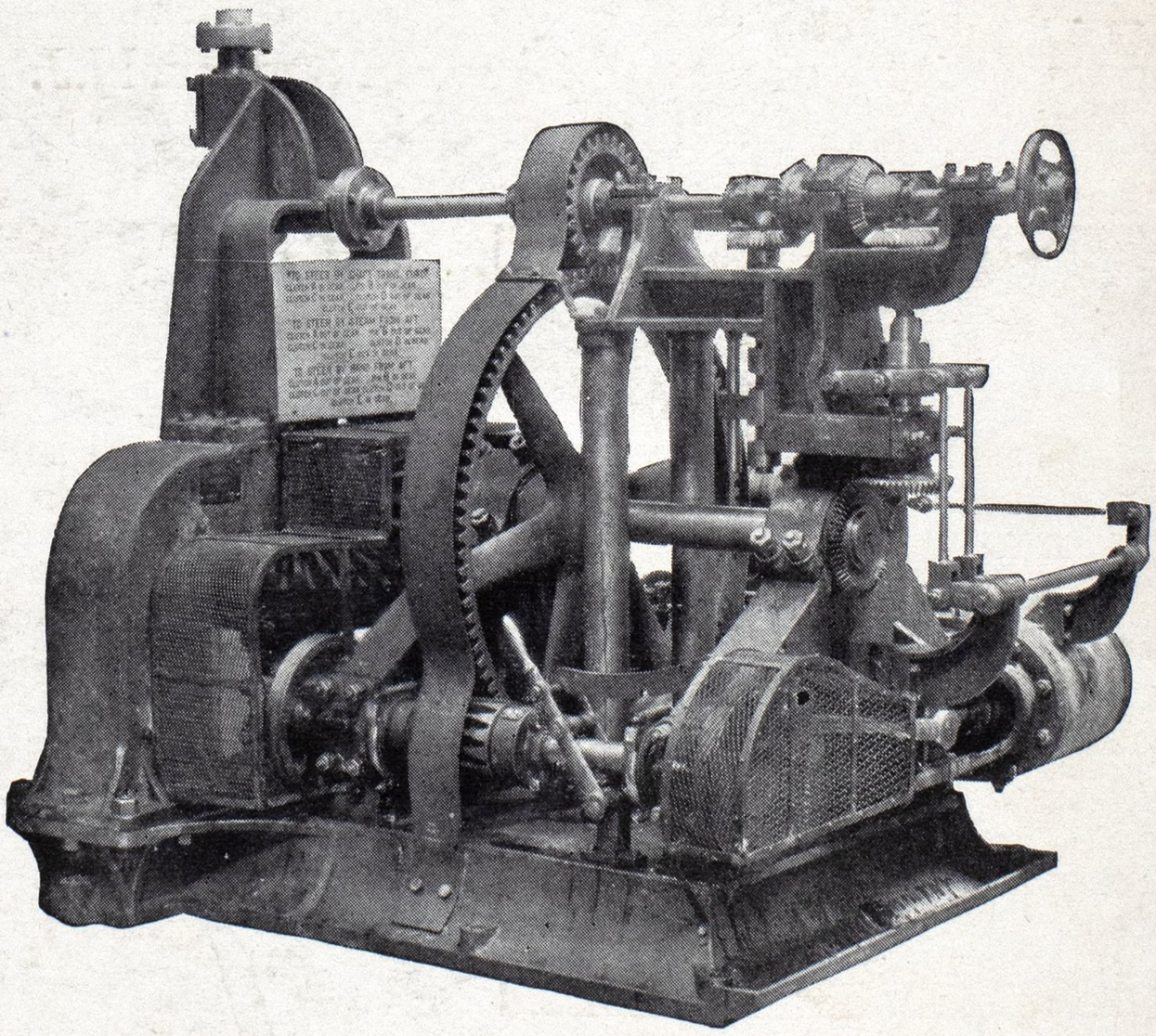
S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.

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HYDE Quadrant Type Steering Gear

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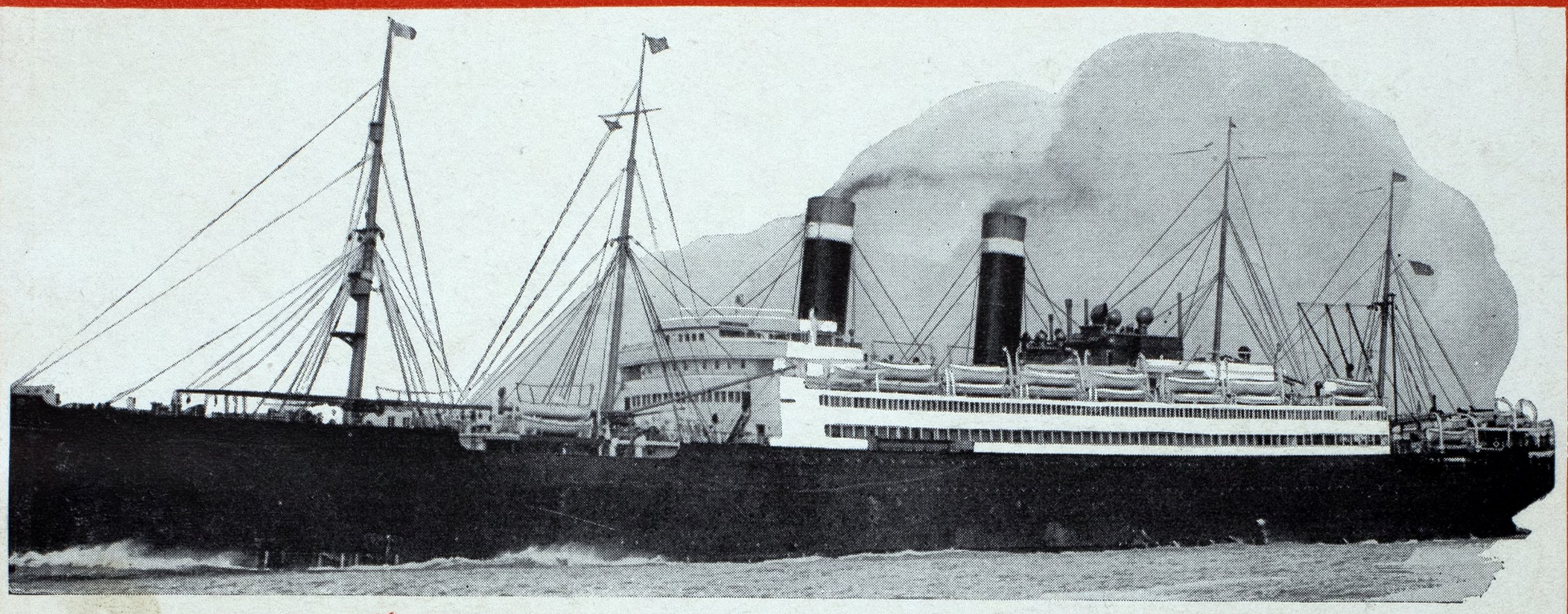
Bath, Maine

Marine Review

Reg U.S. Pat. Off.

The National Publication Covering the Business of Transportation by Water

April, 1929



S. S. "GEORGE WASHINGTON"

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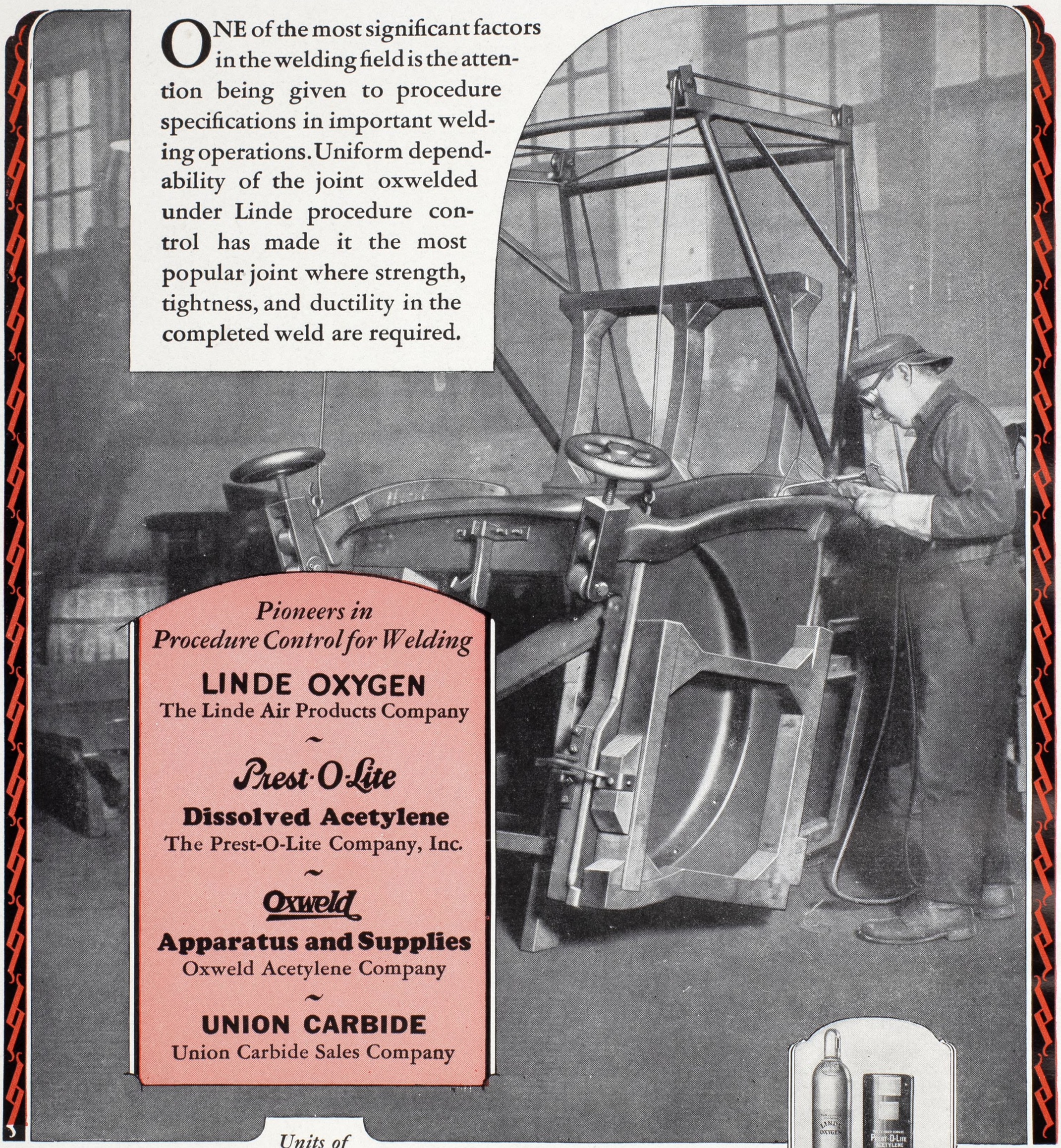
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